

**OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION**

MEMORANDUM

April 12, 2004

TO: Dawson Lasseter, P.E., Chief Engineer, Air Quality Division

THROUGH: David Schutz, P.E., New Source Permits Section
John Howell, E.I., Existing Source Permits Section

THROUGH: Peer Review

FROM: Eric L. Milligan, P.E., Engineering Section

SUBJECT: Evaluation of Construction Permit Application No. **98-172-C (M-15) (PSD)**
Valero Energy Corporation
TPI Petroleum, Inc.
Valero Ardmore Refinery – Administrative Consent Order No. 02-007,
Existing Sulfur Recovery Unit (SRU) with Tail Gas Treating Unit (TGTU), &
Amine Recovery Unit (ARU), New Boiler/CO Boiler, and VOC Railcar
Loading Station
Ardmore, Carter County
Directions from I-35: east three miles on Highway 142

SECTION I. INTRODUCTION

TPI Petroleum, Incorporated (TPI), a company of Valero, currently operates the Valero Ardmore Refinery located in Carter County, Oklahoma. The applicant submitted an application requesting construction of a new VOC railcar loading rack and a separate application for construction of a new CO boiler in addition to the CO boiler permitted under Permit No. 98-172-C (M-13) (PSD). The new railcar loading station and the new CO boiler will be vented through the Asphalt Blowstill and the FCCU Wet Gas Scrubber, which are permitted under Permit No. 98-172-C (M-13) (PSD). In an effort to reduce the amount of material covered in this permit memorandum, this permit memorandum will only address those applicable requirements and state-only requirements that establish terms and conditions in the permit. Only those issues associated with those requirements will be addressed in this permit memorandum.

Permit No. 98-172-C (M-13) (PSD), was a modification of Permit No. 98-172-C (M-12) (PSD). The modified permit increased the allowable emissions and throughput of the existing SRU. The modification was considered as if the original project had never occurred and all netting was revisited to ensure that increasing the emission limits did not cause an exceedance of the PSD significance levels. The requested increases in emissions and sulfur production/throughput were to account for the potential as-built/operational SRU design basis. No new equipment was installed to increase the SRU limitations. The modified permit authorized a daily sulfur production limit of 119 long tons per day (LTPD) based on a 365-day rolling average.

Since certain equipment was included in both Permits No. 95-506-O and 98-172-C (M-12) (PSD), Permit No. 98-172-C (M-13) (PSD) was written to incorporate all of the affected equipment from those permits into one permit. Permit No. 98-172-C (M-13) (PSD) contained all of the requirements from the original permit (98-172-C (PSD)), the modifications authorized in Permit No. 98-172-C (M-12) (PSD), and the requirements concerning the increase in the allowable emissions for the existing SRU.

Permit No. 98-172-C (M-12) (PSD) was a modification of Permit No. 98-172-C (PSD); the original permit issued addressing the requirements of the consent order. Permit No. 98-172-C (PSD) was modified to address the following issues:

- 1) Establishing two emission scenarios for the fluid catalytic cracking unit (FCCU) flue gas scrubber (FSG-200) and the FCCU catalyst hoppers vent.
- 2) Revising the monitoring requirements for the FCCU flue gas scrubber.
- 3) Allowing the permittee to adjust the values of the monitoring parameters determined during testing based on the control device manufacturer's recommendations and engineering assessments.
- 4) Revising the Specific Conditions for the FCCU No. 1 Regenerator and the Platformer Catalyst Regenerator vent to provide for a method of demonstrating compliance with OAC 252:100-35.

Permit No. 98-172-C (PSD) authorized the permittee to modify the facility in accordance with the conditions of Administrative Consent Order No. 02-007. The permit included the construction of control equipment proposed in the April 2000, best available control technology (BACT) determination that was approved by ODEQ. Additionally, supplemental environmental projects (SEP(s)) are included which were within the Administrative Order. The final order included conditions requiring installation of BACT & SEP(s) and implementation of new source performance standards (NSPS) & prevention of significant deterioration (PSD) standards. The major requirements are presented below:

- 1) The incorporation of a wet scrubber (WS) to control emissions of sulfur dioxide (SO₂) and particulate matter (PM) from the exhaust stack of the fluid catalytic cracking unit (FCCU) catalyst regenerators (BACT).
- 2) The incorporation of a scrubber to control PM emissions from the FCCU catalyst storage and receiving hoppers (BACT).
- 3) The removal of the FCCU No. 1 Regenerator Incinerator from service (SEP).
- 4) Replace the FCCU No. 1 regenerator's incinerator by installing a larger more efficient CO boiler, equipped with Low-NO_x Burners (LNB), to control emissions of CO from the FCCU No. 1 regenerator (SEP).
- 5) The existing CO boiler will be retrofitted with LNB to reduce NO_x emissions (BACT).
- 6) Continuation of the present work practice of hydrotreating the FCCU feedstock to reduce emissions of NO_x and SO₂ (BACT).
- 7) Retrofitting the crude oil preheat train indirect fired heat exchangers with Ultra Low-NO_x Burners (ULNB) (BACT).

- 8) Implementation of NSPS, Subpart GGG/VV for fugitive equipment in the Crude Unit, Amine Fuel-Gas Treating Unit, Saturated-gas Unit, Alkylation Unit, Naphtha Hydrotreating (NHT) Unit, Reforming Unit, Isomerization Unit, and Olefin Treating Unit (BACT/NSPS).
- 9) Removal of control valve sour gas vented streams (NHT-Unit, Distillate Heavy-oil Desulfurization Unit (DHDS), Saturated-gas Unit, Sour Water Stripper flash drum, and methyldiethylnolamine (MDEA) flash drum) to the East and West flare system (NSPS).
- 10) Implementation of NSPS, Subpart J, for fuel-combustion-devices (NSPS).
- 11) Implementation of NSPS, Subpart QQQ, for the Crude Unit (NSPS).
- 12) Implementation of NSPS, Subpart Kb, for Sour Water #2 Stripper feedstock storage tank (T-83001) (NSPS).

SECTION II. REFINERY PROCESS DESCRIPTIONS

The Valero Ardmore Refinery's primary standard industrial classification (SIC) code is 2911. The refinery processes medium and sour crude oils from both the domestic and foreign markets. Major production and processing units include the following: an 85 thousand barrel per day (MBPD) crude unit, a 26.2 MBPD vacuum-tower unit, a 12 MBPD asphalt blow-still unit, a 10.4 MBPD polymer modified asphalt unit, a 32 MBPD DHDS unit, a 32 MBPD catalytic feed hydro-treater (CFHT) unit, a 30 MBPD fluid catalytic cracker unit with two-stage regeneration, a 26 MBPD naphtha catalytic hydro-treater unit, a 22 MBPD catalytic reformer unit, a 12.5 MBPD Sat-Gas Unit, a 7.5 MBPD alkylation unit, a 7.5 MBPD isomerization unit, a 119 LTPD sulfur recovery unit, and a 26 MMSCFD hydrogen production unit. The majority of raw crude oil is received on-site through utilization of an integrated pipeline system.

To effect operations, the refinery's process heaters, steam boilers, compressors, and generators are capable of producing approximately 1.6 billion BTUH of energy transfer. The refinery has approximately 2.4 million barrels of refined product storage capability.

Products include conventional and reformulated low sulfur gasoline, diesel fuel, asphalt products, propylene, butane, propane, and sulfur. Refined products are transported via pipeline, railcar, and tank truck.

General Function Of Petroleum Refining

Basically, the refining process does four types of operations to crude oil:

- Separation: Liquid hydrocarbons are distilled by heat separation into gases, gasoline, diesel fuel, fuel oils, and heavier residual material.
- Conversion:
 - Cracking*: This process breaks or cracks large hydrocarbons molecules into smaller ones. This is done by thermal or catalytic cracking.
 - Reforming*: High temperatures and catalysts are used to rearrange the chemical structure of a particular oil stream to improve its quality.
 - Combining*: Chemically combines two or more hydrocarbons such as liquid petroleum gas (LPG) materials to produce high grade gasoline.

- Purification: Converts contaminants to an easily removable or an acceptable form.
- Blending: Mixes combinations of hydrocarbon liquids to produce a final product(s).

Crude Unit

The Crude Unit receives a blended crude charge from sweet and sour crude oil feedstock. The crude charge is heated, desalted, heated further, and then fed into the atmospheric tower where separation of light naphtha, heavy naphtha, kerosene, diesel, atmospheric gas oil and reduced crude takes place. The reduced crude from the bottom of the atmospheric tower is pumped through the diesel stripper reboiler and directly to the vacuum tower pre-heater.

After the vacuum tower pre-heater processes the reduced crude, the reduced crude is then processed in the Vacuum Unit to achieve a single stage flash vaporization. A single-stage flash vaporization of the heated reduced crude yields a hot well oil, a light vacuum gas oil, a heavy vacuum gas oil, slop wax, and a vacuum bottoms residual that may be charged to the asphalt blowstill for viscosity improvement or pumped directly to asphalt blending.

DHDS Unit

The DHDS Unit consists of a feed section, reactor section, effluent separator section, recycle gas amine treating section, and a fractionation section. In the feed section, diesel and gas oil are fed to the unit from the Crude Unit main column. From the feed section, the mixed streams are fed to the reactor section. The feed exchanges heat with the feed/reactor effluent exchangers and is charged to the reactor charge heater. From the charge heater, the heated feed passes through a reactor bed where the sulfur and nitrogen are removed. Once the feed leaves the reactor section, it then must be separated in the reactor effluent separator section. The hydrogen gas and hydrocarbon liquid are separated. The hydrogen gas flows to the recycle gas amine treating section where the H₂S rich gas stream is cleaned using amine to absorb the sour gas. The hydrocarbon liquid flows to the stripping section of the unit.

In the stripping section, any H₂S that is left in the liquid hydrocarbon stream is stripped out with steam and the lighter fraction hydrocarbons are removed. Once the feed has been through the stripping section, it is preheated and fed to the fractionator tower where the kerosene, diesel and gas oil products are fractionated out to meet product specifications.

Saturated-Gas Unit

The feedstock to the Sat-Gas Plant is made up of crude oil atmospheric tower overhead liquid product and the platformer debutanizer overhead liquid product. The debutanizer feed is pumped from the debutanizer feed drum to the 40-tray debutanizer. The debutanized light straight run gasoline leaves the bottom of the debutanizer and is sent to the NHT Unit. The condensed overhead stream is pumped to the 30-tray deethanizer. Ethane, H₂S, and lighter components are removed in the overhead stream and sent to the unsaturated gas treating area in the FCCU. The deethanizer bottoms stream that contains propane and butanes is sent to the saturate C₃/C₄ extractor for mercaptan removal and then to the depropanizer. The condensed liquid from the depropanizer overhead accumulator is sent to the propane dryer and then to storage. The depropanizer bottoms stream is sent to the deisobutanizer located at the Alky Unit for separation of iso-butane and normal butane.

Alkylation Unit

The purpose of this unit is to produce high-octane gasoline by catalytically combining light olefins with isobutane in the presence of HF acid. The mixture is maintained under conditions selected to maximize alkylate yield and quality. The alkylate produced is a branched chain paraffin that is generally the highest quality component in the gasoline pool. Besides the high octane, the alkylate produced is clean burning and has excellent antiknock properties. Propane and butane are byproducts.

Naphtha Hydrotreater Unit

The purpose of this unit is to remove the sulfur, nitrogen and water from the Platformer and Penex (Isomerization) charge stocks. These are contaminants to the Platformer and Penex catalysts. This is accomplished by passing the naphtha feed stocks over hydrotreating catalyst at elevated temperatures in the presence of hydrogen at high pressures. Under these conditions, the sulfur and nitrogen components are converted to H₂S and ammonia (NH₃), which are then easily removed from the liquid effluent by distillation stripping. The removal of the contaminants provides clean charge stocks to the Platformer and Penex units, which increases the operational efficiency of both units.

Platformer Unit

The purpose of this unit is to upgrade low octane naphtha to higher-octane gasoline blending stock. The naphtha is a specific boiling range cut from the Crude Unit. The naphtha is upgraded by using platinum catalyst to promote specific groups of chemical reactions. These reactions promote aromatic formation, which gives the boost in octane. A byproduct from the reactions is hydrogen. The hydrogen is processed to the NHT or CFHT units to aid in hydrotreating of the feedstock(s). The reactions produce light hydrocarbon gases, which are sent to the sat-gas unit.

The continuous catalyst regeneration (CCR) section of the Platformer Unit allows the reaction section to operate efficiently while maintaining throughput year round. The CCR continuously regenerates a circulating stream of catalyst from the reactors. During normal operations in the reaction section, catalyst activation is lowered due to feedstock contaminants and coke buildup. The regeneration section continuously burns off the coke deposit and restores activity, selectivity and stability to essentially fresh catalyst levels.

Isomerization Unit

The purpose of this unit is to increase the octane of light naphtha. The octane is increased by catalytically rearranging straight chain hydrocarbons to branched hydrocarbons. This process is called "isomerization." The bulk of the products from the unit are the isomerates (C₅'s and C₆'s), which are added to the refinery's gasoline blending pool. The advantage of using isomerate is good motor octane, benzene saturation, and aromatic reduction. There will be a small yield of light hydrocarbons, which are added to the refinery fuel gas system.

Cat Feed Hydrotreater

Hydrotreating is a process to remove chemically bound sulfur, nitrogen, and metals present in hydrocarbons and/or catalytically stabilize petroleum products by reacting them with hydrogen. The cat feed hydrotreater has two primary functions: 1) improve the quality of the feed to the

FCCU by removing impurities (sulfur and nitrogen) and 2) increasing the hydrogen content by saturating the aromatics in the gas oils and light cycle oil feedstocks.

Feed to the cat feed hydrotreater enters the unit from several sources: high sulfur diesel from 81 Tank; light cycle oil from the FCCU; gas oil from the Crude Unit; either vacuum or atmospheric residue from the Crude Unit; and hydrogen from the Hydrogen Unit. The combined liquid feed is filtered and then heated in a series of exchangers before entering the feed surge drum. Liquid feed from the surge drum is pumped to the reaction section of the unit through the multistage charge pump. Hydrogen feed is compressed to the unit operating pressure by two reciprocating compressors. The fresh hydrogen feed along with recycled hydrogen from a steam turbine driven centrifugal compressor combines with the liquid feed in the reaction section of the unit.

The combined feedstock to the unit is heated in the reactor charge heater and then enters the first of three reactors in series. The reactors each contain a different type of catalyst with a very specific but complementary role. The primary role of the catalyst in the first two reactors is to remove metals contained in the feed such as nickel and vanadium. The catalyst in the third reactor is primarily designed to convert sulfur and nitrogen into H_2S and NH_3 . The effluent from the reactors then enters a series of separators.

There are four separators in the cat feed hydrotreater: hot high pressure separator, hot flash drum, cold high pressure separator, and cold flash drum. The primary function of these vessels is to separate the oil from the hydrogen-rich gas in the reactor effluent. Each vessel is operated at different conditions (temperature and pressure) to allow certain components in the reactor effluent to vaporize. Hydrogen recovered in the cold high-pressure separator is routed to the recycle gas amine treater. Light ends, such as methane and ethane, are sent to the refinery sour fuel gas system. Water recovered is sent to a sour water stripper. All of the remaining oil is then combined and sent to the fractionation section of the unit.

Hydrogen recovered from the reactor effluent contains H_2S . The unit is designed to have 0.5-1.0% H_2S in the recycle gas. To control the H_2S at the desired level, a portion of the recycle gas is sent to the MDEA absorber. Recycle gas enters the bottom of the amine absorber and is contacted by a counter-current flow of amine across trays. The H_2S is absorbed by the amine and sweet hydrogen exits the top of the absorber. Amine exits the bottom of the absorber and is regenerated in the MDEA regeneration unit.

The oil from the separators is routed to the fractionation section of the unit. The oil is heated in the fractionator charge heater and then enters the fractionator. The fractionator is a trayed tower. The fractionator separates the oil into three streams: overhead naphtha product; diesel product; and FCCU feed. The diesel product is stripped of light ends and H_2S in the distillate stripper before being sent to storage.

FCCU

The main purpose of the FCCU is to break up heavy hydrocarbons into a mixture of lighter hydrocarbons and then separate the mixture. The major divisions of the plant are the FCCU charge system, the reactor-regenerators, the main (fractionator) column, and the gas concentration unit.

In the FCC Charge System, the feed is collected in a common feedstock surge drum and heated before it is sent to the FCC Unit. The feedstock comes from four sources: residuum from the vacuum tower, treated gas oil from storage, gas oil from the crude/DHDS unit, and hot gas oil from the CFHT Unit. The hot and cold charge streams are mixed in the charge drum to reach a desired temperature. The outlet stream from this drum combines with the residuum stream and is pumped through the charge heater where, if necessary, the feed is heated. Finally, the feed is sent to the FCCU reactor to effect the desired cracking reactions.

The catalytic cracking for the process is achieved by processing the superheated feedstock with a cracking promoting catalyst. A byproduct, coke, is produced during the cracking reactions. As a result, the catalyst is covered with coke that must be burned off the catalyst. This is achieved in the FCCU No. 1 and No. 2 regenerators. This burning process results in temperatures normally above 1,300 °F. The hot catalyst is recirculated through the system to mix with more feed to control the reactor temperature.

The cracked gas oil must be separated into useable products, namely slurry or #6 fuel oil, light cycle oil (LCO) or diesel fuel, FCCU gasoline or blend stock for motor gasoline and light liquefied petroleum gases (LPG) including olefins.

MDEA Unit

MDEA temporarily forms a weak and unstable salt with CO_2 and H_2S under certain conditions. These conditions are promoted within the operation processes in the fuel gas absorber and amine contactors. Once this weak and unstable amine salt solution is formed, the reaction must be reversed to clean up or regenerate the amine solution. This reaction takes place in the MDEA regenerator.

The MDEA solution is fed to the stripping tower from the MDEA flash drum. As the solution travels down the tower, the acid gases are stripped as the salt solution is broken down by heat that is supplied by two steam reboilers at the base of the tower. The lean regenerated MDEA is then pumped back to the lean MDEA surge drum where the low- and high-pressure MDEA charge pumps charge the regenerated amine solution back to the fuel gas absorber and amine contactors.

Sour Water Strippers

The purpose of the sour water strippers is to remove H_2S and NH_3 from the total sour water inlet stream. The H_2S and NH_3 are stripped from the sour water feed as the water travels down the column. Rising steam strips out the H_2S and NH_3 gases. These gases are routed to the SRU/SCOT Unit to convert the H_2S gas stream to sulfur and to destroy the NH_3 in the thermal section of the SRU.

SRU / SCOT Process

The SRU converts the H_2S stream from the MDEA regenerator to liquid elemental sulfur to be loaded out by rail car or truck. This process takes place in two general sections: 1) H_2S is converted to sulfur at high temperatures without the aid of catalytic conversion; and 2) sulfur is formed at much lower temperatures with the aid of catalytic conversion.

In section one, high thermal temperatures are maintained by using liquid oxygen, which also aids in the destruction of NH_3 contained in the sour water gases which are destroyed in the thermal section of the SRU. In section two, unconverted sulfur is processed through two successive catalytic stages. Each stage consists of process gas reheating, sulfur conversion over an activated alumina catalyst and then cooling to condense and recover the sulfur formed.

The SCOT Unit operation is much the same as the MDEA Unit operation. Unprocessed tail gas from the SRU is heated and mixed with a hydrogen rich reducing gas stream. This heated tail gas stream passes through a catalytic reactor where SO_2 is converted to H_2S . The gases are routed to a quenching system where the gases are cooled by direct mixing with a water spray. The condensed water from the reactor product is routed to the sour water system. The cooled reactor effluent is then fed to an absorber/stripper section where the acid gas comes in contact with an amine solution and is absorbed (absorber) and then regenerated (stripper) to be reprocessed back to the SRU.

Wastewater Treatment Plant (WWTP)

The WWTP is for the purpose of treating refinery wastewater from the various units and tank farm to comply with specific discharge characteristics specified by the refinery National Pollution Discharge Elimination System (NPDES/OKPDES) permit. The system is comprised of an oily water sewer collection system from the various units and the tank farm, a lift station, two above ground oil water separation tanks, two aggressive bio-reaction tanks, 16 aerated lagoons and two clarifier lagoons. Flow through the system from beginning to discharge is as stated above. The system treats approximately 600,000 gallons of wastewater daily.

Product Movement Tank Farm

The purpose of the tank farm and product movement area is to receive, hold, blend, and ship hydrocarbon products in a safe and efficient manner. The major product groups include crude, intermediate feedstocks, LPG, gasolines, distillates, heavy fuel oil, and asphalts. Distillate and gasoline products are shipped via three outlets. These products are also loaded onto trucks at the truck dock. Various LPG's are loaded and unloaded by truck and rail. Asphalt and heavy fuel oil are primarily shipped by truck, but rail connections can also be used.

SECTION III. BACKGROUND FOR MODIFICATIONS

First, the background concerning the recent modifications will be addressed and then the background for each individual modification covered under Permit No. 98-172-C (M-13) (PSD) will be addressed.

Addition of VOC Railcar Loading Station

The addition of the VOC railcar loading station is to allow the refinery to load alkylate into railcars for shipment. The loading station will be vented to the Asphalt Blowstill Incinerator to control emissions of VOC to below the required NESHAP, Subpart R limit of 10 mg/L. The railcar loading station will have a maximum loading rate of 2,000 BPD. The modification will also include allowing storage of alkylate in Tank T-1018 which currently serves as a sour naptha

storage tank for the naptha hydrotreating unit. The tank is currently subject to NESHAP, Subpart CC as a group 1 storage tank and will remain subject to NESHAP, Subpart CC as a group 1 storage tank.

Addition of 144 MMBTUH Boiler/CO Boiler

The new boiler will be able to fire refinery fuel gas and refinery fuel gas in combination with the FCCU No. 1 regenerator's flue gas. The new boiler will be equipped with ULNB burners. Emissions from the boiler with ULNB are below the PSD significance levels. This boiler is subject to NSPS, Subparts Db and J. The boiler will be vented through the FCCU WGS stack. The existing CO Boiler will be removed from service. Steam generated by the new boiler will be used to rotate a turbine, which will produce electricity for the refinery.

1976 Replacement of the East Flare

Replacement of the East Flare subjected it to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries).

1980 Construction of the Reformer Unit's CCR

Construction of the Reformer Unit's CCR required a PSD permit based on the potential emissions changes associated with the modifications.

Pre/Post- 1981-82 Construction/Modifications of the FCCU

The modifications of the FCCU required a PSD permit based on the potential emissions changes associated with the modifications. In addition, the modifications also subjected the FCCU to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions), J (Petroleum Refineries), and GGG (Equipment Leaks of VOC in Petroleum Refineries).

1981-82 Construction/Modification of FCCU Catalyst Receiving Hoppers

The modifications to FCCU Catalyst Receiving Hoppers required a PSD permit based on the potential emissions changes.

1984-85 Construction of CO Boiler

The construction and subsequent operation of the CO boiler required a PSD permit based on the potential emissions changes associated with the modification. In addition, the modification was also subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries).

1987 Modification of the Reforming Unit

Modification of the reforming unit subjected it to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and GGG (Equipment Leaks of VOC in Petroleum Refineries).

1990 Crude Unit Refurbishment

The modifications of the existing equipment required a PSD permit based on the potential emissions changes associated with the modifications. In addition, the modifications were subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions), J

(Petroleum Refineries), GGG (Equipment Leaks of VOC in Petroleum Refineries), and QQQ (VOC Emissions from Petroleum Refinery Wastewater Systems).

Pre/post-1990 Modifications of the Alkylation Unit

The modifications of the alkylation unit in 1978, 1981, 1984, 1987, 1991 included the installation of a butane HF treating system and other modifications to enable more efficient processing and acid control/product recovery. These modifications subjected the Alkylation Unit to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and GGG (Equipment Leaks of VOC in Petroleum Refineries).

Low-Sulfur Fuels Projects (Permits No. 91-160-C/O & 95-506-C/O)

The project was to allow production of low-sulfur (0.05% by weight) fuel oil. Sulfur reductions were achieved by upgrading and expanding the hydrotreating facilities at the refinery. To offset the increase in NO_x emissions, several process heaters were to be outfitted with low-NO_x burners. The existing platformer/alkylation unit's flare and sour water incinerators were also replaced. Modification of the flare and the sour water incinerator made them subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries). The emission changes resulting from the original project were addressed in Permit No. 91-160-C (effective April 16, 1992) with accompanying Evaluation of Permit Memorandum. All emissions changes were calculated to be less than the PSD significance levels at the time the permit was issued. In the operating permit (91-160-O), the emission changes were reevaluated since the project was not constructed exactly as described in the construction permit.

The company later requested to increase the capacity of the SRU at the refinery. Since the requested increase in the SRU capacity affected an emission unit covered by Permit No. 91-160-C/O, the SRU expansion could be viewed as a phase of the earlier low-sulfur fuel project, and to eliminate confusion about which permit was applicable, all of the emission units and limits were incorporated into a new permit in which the netting procedures were repeated. The emission changes resulting from the original project and expansion of the existing SRU were addressed in Permit No. 95-506-C (effective December 5, 1995) with accompanying Evaluation of Permit Memorandum. All emissions changes were calculated to be less than the PSD significance levels at the time the permit was issued. Permit No. 95-506-C involved four new heaters and the modified sour-water incinerator, alkyl/plat flare, and SRU. The operating permit (95-506-O) did not differ from the construction permit. Later on, the operating permit was modified to include the sour-water storage tank (T-83001).

The facility recently submitted an application requesting modifications of the emission limits established in Permits No. 98-172-C (M-12) (PSD) and 95-506-O (M-1) for the existing SRU (HI-501), the asphalt blowstill (HI-801), the alkyl/plat flare (HI-803), and heaters H-603, H-6501, and H-6502. The changes in the emission limits also addressed the requested emission increases for HI-501 and the netting issues previously addressed in Permits No. 91-160-C/O and 95-506-C/O/O (M-1). Since certain equipment was included in Permits No. 95-506-O and 98-172-C (M-12) (PSD), Permit 98-172-C (M-12) (PSD) was modified to incorporate all of the affected equipment into one permit. Some of projects involved in the low-sulfur fuels project are covered separately later.

1991 Reconstruction of the Refinery's West Flare

Replacement of the West Flare subjected it to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries).

1993 Construction of the Reforming Heater H-15001

The application to construct the Reforming Heater H-15001 was filed with ODEQ on December 23, 1991. Permit No. 91-160-C, effective April 16, 1991, enabled the refinery to construct equipment and perform operational modifications within the crude, DHDS, CFHT, SRU, and sour water system. These modifications enabled the refinery to produce low-sulfur (0.05 wt%) diesel fuels. The modifications incorporated the netting procedures utilized in PSD reviews and became federally enforceable as such. The Air Quality permit memorandum for Permit No. 91-160-C, dated April 16, 1992, detailed the review.

The Air Quality permit memorandum for Permit 91-160-O, effective July 21, 1995, provides the basis of emissions. Permit No. 95-506-O superseded Permit No. 91-160-O, which was then null and voided by Permit No. 95-506-O (M-1). The Reforming Heater is subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries).

1993 Modification of the Refinery's Fuel-Gas Amine Treating System

The modifications subjected the Refinery Fuel Gas Amine Treating System to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and GGG (Equipment Leaks of VOC in Petroleum Refineries).

1993 Sat-Gas Plant's LPG Amine Contactor Addition

The modification of the Sat-gas plant subjected it to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and GGG (Equipment Leaks of VOC in Petroleum Refineries).

1993 Construction of the Refinery's Diesel-Fired Air Compressor

Installation of the diesel-fired air compressor would have required a PSD permit based on the potential emissions changes associated with the modification. This permit will address the modification in the context of PSD and limit it to below PSD significance levels.

1994 Modification of the Refinery's Olefin Treating Unit

The modifications subjected the Olefin Treating Unit to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and GGG (Equipment Leaks of VOC in Petroleum Refineries).

1994 Construction of Blowstill Incinerator HI-801

Permit Application No. 91-160-C included a request to replace the existing incinerator that was in use at that time with a new incinerator with an equivalent capacity. Permit No. 91-160-C, effective April 16, 1992, approved the construction and modification activities. The PSD review was based on federally enforceable limitations established by the formal netting procedures included in the application. The review detailed the overall contemporaneous emission increases. All emission increases were below the significance levels.

Permit No. 91-160-O, effective July 21, 1995, addressed the actual construction and modifications that occurred within the scope of the application. The application for operation of the facilities modified or constructed during the project as conditioned by Permit No. 91-160-C was submitted to ODEQ. Permit No. 95-506-O superceded Permit No. 91-160-O, which was then voided by Permit No. 95-506-O (M-1). A follow-up PSD netting review (operating permit application) indicated that the adjustments to the information originally submitted (construction permit application versus actual/potential operating permit application) resulted in less than significant emission(s) increases for criteria pollutants, as well. The Blowstill Incinerator is subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries). This netting was again reviewed in Permit No. 98-172-C (M-13) (PSD).

1994 Construction of Emergency Generators EEQ-8801 & EEQ-80001

Permit No. 97-523-O authorized the operation of these generators. The engines operated without a permit until issuance of Permit No. 97-523-O. The permit authorized each of these generators to be operated up to 200 hours per year for maintenance checks and possible power outages and with a maximum fuel sulfur content of 0.5% by weight. This permit will establish a limit of 800 hours per year and a maximum fuel sulfur content of 0.05% by weight.

1995 Modification of Platform Heaters

Heaters H-404 and H-405 were modified in 1995 to be fueled with two types of fuel: natural gas and vent gas from the CCR Reformer. Since the modification increased emissions from the heaters, they became subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries).

1996 Construction of the Loading Dock Vapor Incinerator

In order for the gasoline loading operations to comply with NESHAP, Subpart CC, and Subparts A and R, the refinery was required to install a vapor incinerator at the gasoline and diesel loading rack. The refinery submitted the application for the incinerator on September 6, 1996. The refinery received Permit No. 96-450-C, effective October 17, 1996, authorizing construction of the vapor incinerator. On April 28, 1997, the refinery submitted an application to operate the vapor incinerator and on May 30, 1997, Air Quality issued Permit No. 96-450-O, approving operation of the vapor incinerator. The Loading Dock Incinerator is subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and J (Petroleum Refineries).

1996 & 1998 Construction of Hot-Oil-Heaters H-100024 & H-210001

Heater H-20001 was installed in 1996, as authorized by Permit No. 96-402-C (M-1), and was due to the installation of the PMA unit at the refinery. Construction for heater H-100024 began in 1998, as authorized by Permit No. 98-172-C, to integrate a hot-oil heating system into the asphalt storage tank area; this heater replaced certain individual tank heaters and enabled more efficient energy utilization. These units are subject to the relevant provisions and standards of NSPS, specifically Subparts A (General Provisions) and Dc (Small Industrial-Commercial-Institutional Steam Generating Units).

SECTION IV. AFFECTED EQUIPMENT - EMISSION UNIT (EU) GROUPS**EUG 2 Tank T-1018**

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1018	P-2	External Floating	Alkylate & Gasoline	62,857	1953

EUG 3 Tank T-1019

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1019	P-3	External Floating	Alkylate & Gasoline	66,857	1948

EUG 4 Tank T-153

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-153	P-4	Fixed Roof	FCCU Charge	200,114	2001

EUG 23 Tank T-1115

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1115	P-23	External Floating	Gasoline	27,214	<1968

EUG 24 Tank T-1116

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1116	P-24	External Floating	Gasoline	27,310	<1968

EUG 34 Tank T-1130

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1130	P-36	External Floating	Gasoline	79,405	9/1978

EUG 38 Regenerated/Make Up Amine Storage Tank V-523

EU	Point	Roof Type	Contents	Barrels	Const. Date
V-523	P-41	Cone	Amine	86	<1968

EUG 49 Sour Water Stripper Tank T-83001

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-83001	P-56	Cone	Sour Water	18,500	1993

EUG 101 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-102B	P-102	Process Heater	135.0	Mod. 1990

EUG 102 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-102A	P-103	Process Heater	160.0	Mod. 1990

EUG 103 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-403	P-104	Process Heater	98.7	1975

EUG 104 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-404	P-105	Process Heater	48.5	Mod. 1995

EUG 105 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-405	P-106	Process Heater	50.8	Mod. 1995

EUG 106 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-406	P-107	Process Heater	28.0	1974

EUG 108 Process Heater*

EU	Point	Description	MMBTUH	Const. Date
H-602	P-109	Process Heater	42.5	1974

* - Removed from service

EUG 115 Process Flare (East)

EU	Point	Description	MMBTUH	Const. Date
Crude Unit Flare	P-116	Process Flare	27.0	1976 Mod. 2004

EUG 116 Asphalt Blowstill and Thermal Oxidizer

EU	Point	Description	Const. Date
HI-801	P-117	Asphalt Blowstill and Thermal Oxidizer	1992

EUG 118 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-201	P-119	Process Heater	116.7	1974

EUG 120 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-401A	P-121	Process Heater	16.0	< 1968

EUG 121 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-401B	P-122	Process Heater	14.8	1974

EUG 122 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-402A	P-123	Process Heater	13.9	< 1968

EUG 123 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-402B	P-124	Process Heater	15.8	< 1968

EUG 124 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-407	P-125	Process Heater	25.0	1974

EUG 126 Boiler

EU	Point	Description	MMBTUH	Const. Date
B-802	P-127	Boiler	89.8	1975

EUG 127 Boiler

EU	Point	Description	MMBTUH	Const. Date
B-803	P-128	Boiler	86.8	1975

EUG 128 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-411	P-129	Process Heater	21.7	1985

EUG 134 Refinery Flare (West)

EU	Point	Description	MMBTUH	Const. Date
HI-81001	P-135	Platformer and Alkylolation Units	28.0	1993

EUG 135 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-603	P-136	Process Heater	125.5	1992

EUG 136 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-6501	P-137	Process Heater	92.1	1992

EUG 137 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-6502	P-138	Process Heater	54.3	1992

EUG 138 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-15001	P-139	Process Heater	326.8	1992

EUG 139 Process Heater

EU	Point	Description	MMBTUH	Const. Date
H-210001	P-140	Process Heater	12.2	1996

EUG 140 Gasoline Loading Rack Vapor Combustor

EU	Point	Const. Date
Light Products Loading Terminal	P-141	1996

EUG 141* FCCU Flue Gas Scrubber

EU	Point	Description	Const. Date
FGS-200	P-142	FCCU No. 1 Regenerator/CO Boiler and FCCU No. 2 Regenerator	2002-3

* - EUGs 141A, 141B, and 141C, will all be vented to this EUG and point upon completion of the modifications. EUG 145 will either be vented to this EUG or another wet scrubber.

EUG 141A FCCU No.1 Regenerator and CO Boiler/Incinerator

EU	Point	Description	Const. Date
HI-251	P-143	FCCU No. 1 Regenerator and CO Boiler/Incinerator	Mod. 1996

EUG 141B CO Boiler

EU	Point	Description	MMBTUH	Const. Date
B-252	P-143	CO Boiler	92.0	1984
B-253	P-143	CO Boiler	125.8	2004-5
B-254	P-143	Boiler/CO Boiler	144.0	2004-5

EUG 141C FCCU No. 2 Regenerator

EU	Point	Description	Const. Date
R-251	P-142	FCCU No. 2 Regenerator	Mod. 1996

EUG 142 #1 SRU Incinerator

EU	Point	Description	MMBTUH	Const. Date
HI-501	P-144	#1 SRU Incinerator	8.2	1995

EUG 143 Emergency Generators

EU	Point	Make/Model	KW	Serial #	Const. Date
EEQ-8801	P-145	DMT/DMT-825D2	750	93447-1	1994
EEQ-80001	P-146	Cummins/6BT5.9G-2	80	45555233	1997

EUG 145 FCCU Catalyst Hopper Vent

EU	Point	Description	Const. Date
cat_hop	P-149	FCCU Catalyst Hopper Vent	Mod. 1981

EUG 146 Platformer Catalyst Regeneration Vent

EU	Point	Description	Const. Date
CCR	P-150	Platformer Catalyst Regeneration Combustion Vent	1980

EUG 147 Instrument/Plant Air Compressor

EU	Point	Make/Model	hp	Serial #	Const. Date
C-80018	P-151	Detroit Diesel/8V-92TA	450	69102	1993

EUG 148 Asphalt Tank Heater

EU	Point	Description	MMBTUH	Const. Date
H-100024	P-152	Asphalt Tank Heater	13.5	1999

EUG 169 Tank T-155

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-155	P-169	External Floating	Heavy Naphtha	164,000	2003-4

EUG 175 #1 SRU Sulfur Storage Pit

EU	Point	Contents	Const. Date
SSP-520	SSP-520	Sulfur	1995

EUG 176 #1 SRU Molten Sulfur Railcar Loading Arm

EU	Point	Loading Rack	Loading Arm	Const. Date
MSLA-520	MSLA-520	1	1	1995

EUG 185 VOC Railcar Loading Station

EU	Point	Loading Rack	Loading Arm	Const. Date
RCALOAD 900	P-185	1	1	2004

EUG 186 VOC Railcar Loading Fugitive Sources

EU	Point	Number Items	Type of Equipment
RCFUG	P-186	52	Valves
		106	Flanges
		1	Other
		1	Pumps

EUG 200 Crude Unit Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 100	F-100	2,338	Valves
		3,876	Flanges
		15	Other
		46	Pumps

EUG 205 Amine Fuel Gas Treating System Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 550	F-105	403	Valves
		677	Flanges
		4	Other
		11	Pumps

EUG 206 Sat. Gas Plant Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 300	F-106	835	Valves
		1,389	Flanges
		12	Other
		7	Pumps

EUG 207 Reformer "Platformer" Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 400	F-107	2,074	Valves
		3,488	Flanges
		23	Other
		16	Pumps

EUG 208 Isomerization Unit Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 450	F-108	786	Valves
		1,294	Flanges
		17	Other
		5	Pumps
		2	Pump Seals

EUG 211 HF Alkylation Unit Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 900	F-111	2,295	Valves
		3,803	Flanges
		23	Other
		31	Pumps

EUG 214 Wastewater Treatment Unit Fugitive Sources

EU	Point	Number Items	Type of Equipment
ASU	F-114	154	Valves
		258	Flanges
		---	Other
		6	Pumps

EUG 219 Olefin Treating Unit Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 250	F-119	1,118	Valves
		969	Flanges
		5	Other
		12	Pumps

EUG 232 #1 TGTU & ARU Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 500	F-500	231	Valves
		369	Flanges
		5	Other
		9	Pumps

EUG 233 #1 SRU TGTU & ARU Wastewater Processing

EU	Point	Number Items	Type of Equipment
WW-500	F-500b	27	P-Trap
		2	Junction Box

EUG 234 #1 SRU Fugitive Sources

EU	Point	Number Items	Type of Equipment
Area 520	F-520	141	Valves
		240	Flanges
		2	Other
		5	Pumps

EUG 235 #1 SRU Wastewater Processing

EU	Point	Number Items	Type of Equipment
WW-520	F-520b	10	P-Trap

SECTION V. EMISSIONS

The implementation of NSPS and OAC 252:100 new source review (NSR) standards in conjunction with PSD standards has resulted in a significant reduction of the emissions of criteria pollutants at the refinery. The table below provides the overall pre-PSD and post-PSD review emissions when considering the time-frame of activities identified within this review as identified in the order and the respective permitted standards. The quantification of these emissions and the assumptions utilized are discussed in detail in this section. These emissions are not presented in exactness as a conclusive determination, but rather are an attempt to represent the magnitude of the effectiveness of the review. Emissions from the facility were based on an extensive assessment of the modifications to the refinery, the applicable standards, and the equipment involved. The table below provides a list of active permits, registrations, and applicability determinations affected by this permit. This permit will supercede any conditions of the previous permits that affect the EUs incorporated into this permit.

List of Affected Air Quality Permits and Determinations

74-171-C	98-172-AD
93-076-O	98-172-AD (M-5)
93-101-O	98-228-O
96-402-O-(M-1)	98-229-O
96-450-O	98-264-O
97-523-C	98-265-O

Emission statements are not exactly conclusive in presentation; yet they represent the approximate quantification(s). As technology developed through the timeframe as provided, actual and potential emissions became to be dependent on updating emission factors in the absence of continuous monitoring systems. Historical emission estimates are not conclusive, or exact, yet are an estimate based on the attempt to quantify changes associated with modifications occurring within a time-frame as indicated to reflect upon the net emissions potential decreases established by NSPS, NSR, and BACT applications.

Emissions From The New Boiler/CO Boiler Project

The new CO boiler will be equipped with ULNB. The primary design basis for the boiler is firing 100% refinery fuel-gas. The secondary design basis is firing all of the FCCU No. 1 Regenerator flue-gas in combination with refinery fuel-gas. The table below summarizes emissions for criteria pollutants for the CO boiler operation. The emissions shown below only represent the emissions arising from operation of the boiler itself and not the criteria pollutant emissions processed through the boiler. The existing CO boiler will be removed from service.

NO_x		CO		PM₁₀		SO₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8.64	37.84	11.86	51.94	1.07	4.70	4.84	21.19	0.78	3.40

Emissions are based on a heat input rating of 144 MMBTUH and the following:

NO_x - manufacturers guarantee of 0.060 lb/MMBTU;

CO, VOC, & PM₁₀ - AP-42, Section 1.4 (7/98);

SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a heating value of 800 BTU/SCF.

Emissions from VOC Railcar Loading Station Project

The table below lists the associated emission changes for the gasoline/alkylate storage tank (T-1018) and the associated fugitive equipment, and the controlled emissions from the railcar loading station. The railcar loading station will be vented through the asphalt blowstill and will be added to the emission limits for the asphalt blowstill thermal oxidizer. The railcar loading station will be subject to NESHAP, Subpart R, and an emission limitation of 10 mg/L.

	NO_x		CO		VOC		PM₁₀	
EU	lb/hr	TPY	lb/hr	lb/hr	TPY	TPY	lb/hr	TPY
T-1018 ¹	----	----	----	----	2.35	10.28	----	----
RCFUG ²	----	----	----	----	0.27	1.18	----	----
RCLOAD900 ³	0.10	0.12	0.54	0.63	1.10	1.29	0.01	0.01
Total Emission Increases	0.10	0.12	0.54	0.63	3.72	12.75	0.01	0.01

¹ Emissions represent the potential emissions using a throughput of 733,505 bbl/yr of gasoline/alkylate with an RVP of 15 minus the actual average emissions from 2001 and 2002.

² Potential emissions are based on an estimated number of equipment evaluated at LDAR screening values of a maximum of 10,000-ppm as provided for in NSPS, Subpart GGG.

³ Potential emissions are based on a short-term throughput of 220 gallons per minute, an annual throughput of 733,505 bbl/yr, and the following:

NO_x & CO - the emission factors from AP-42, Section 13.5 (1/95), and a heat rating of 130,000 BTU/gallon;

VOC – the allowable emission factor from NESHAP, Subpart R of 10 mg/L (0.0835 lb/1,000 gallon).

Emissions from Tanks T-1019, T-1115, T-1116, T-1130, T-153, and T-155

Source	VOC	
	lb/hr	TPY
Tank T-1019	5.50	24.08
Tank T-1115	0.83	9.98
Tank T-1116	0.83	9.97
Tank T-1130	6.11	26.76
Tank T-153	0.40	1.75
Tank T-155	0.60	2.64
Total	14.270	75.180

VOC emissions from the tank are based on EPA TANKS 4.0, and the following maximum throughputs and vapor pressures: T-1019 - 2,737,500 bbl/yr and a RVP of 15, T-1115 - 11,205,500 bbl/yr and a RVP of 15, T-1116 - 9,510,400 bbl/yr and a RVP of 15, T-1130 - 10,402,500 bbl/yr and a RVP of 15, T-153 – 10,950,222 bbl/yr and a vapor pressure of 0.002 psia, T-155 - 9,490,000 bbl/yr and a vapor pressure of 1.6 psia.

Emissions from the Existing SRU Netting Project

The table below details the actual average and potential emissions from the affected emission units.

Actuals Pre-mod.¹	TPY NO_x	TPY CO	TPY PM₁₀	TPY SO₂	TPY VOC	TPY H₂S
H-501 ²	10.16	5.69	0.73	7.59	0.37	0.05
H-801 Blowstill Gases ³	5.34	4.49	0.79	13.60	0.29	0.27
H-801 SWS Gases ⁴	340.90	----	41.49	1,478.83	----	29.57
H-801 Auxiliary Fuel ⁵	3.59	19.51	0.39	1.64	7.38	0.02
H-602 ⁶	9.01	7.57	0.69	2.85	0.50	0.03
HI-81001 ⁷	10.91	59.37	1.20	1.81	22.46	0.02
Wastewater ⁸	----	----	----	----	14.10	0.85
Railcar Loading ⁹	----	----	----	----	----	0.11
Sulfur Storage Pit ¹⁰	----	----	----	----	----	0.11
Sub-Total	379.91	96.63	45.29	1,506.32	45.10	31.03
PTE Post-mod.						
H-501 ¹¹	8.50	4.76	1.89	52.01	0.31	0.31
HI-801 Blowstill ¹²	41.03	22.47	2.99	33.97	1.47	0.37
H-603 ¹³	36.28	22.80	4.10	18.47	2.96	0.18
H-6501 ¹⁴	24.20	16.29	3.01	13.55	2.18	0.13
H-6502 ¹⁵	14.27	9.61	1.77	7.99	1.28	0.08
H-15001 ¹⁶	52.96	42.94	10.67	48.09	7.72	0.46
HI-81001 ¹⁷	8.34	45.38	0.91	4.12	17.17	0.04
T-83001 ¹⁸	----	----	----	----	6.20	----
Added Fugitives ¹⁹	----	----	----	2.60	12.33	0.33
Wastewater ²⁰	----	----	----	----	17.09	9.07
Railcar Loading ²¹	----	----	----	----	----	2.54
Sulfur Storage Pit ²²	----	----	----	----	----	0.29
Sub-Total	185.58	164.25	25.32	180.80	68.71	13.80
Net Change	-194.33	67.62	-19.95	-1,325.52	23.61	-17.23

¹ Emissions represent actual average emissions from 1989 and 1990.

² Existing emissions from the SRU incinerator are based on the following:

NO_x, CO, PM₁₀, VOC - For emissions from combustion of the auxiliary fuel, emissions were based on an average fuel usage of 143.5 MMSCFY, a heat content of 867 BTU/SCF (HHV), the emission factor from AP-42, Section 1.4 (7/98); for emissions from combustion of the waste gas, emissions were based on a flow rate of 68,099 SCFH of waste gas, a heat content of 23 BTU/SCF, the emission factor from AP-42, Section 1.4 (7/98), and an adjustment factor of 1.5; NO_x emissions include a safety factor of 1.5 and PM₁₀ emissions have been adjusted for emissions of H₂SO₄;
 SO₂ - Based on an average concentration of 50 ppmv and a flow rate of 210,296 DSCFH @ 0% O₂; approximately 1.8% of SO₂ emissions will be emitted as SO₃ and converted to H₂SO₄;

³ Actual emissions from combustion of the asphalt blowstill gases are based on a flow rate of approximately 308 SCF/bbl and an average production rate of 5359.5 bbl/day and the following:

NO_x, CO, VOC, & PM₁₀ - AP-42, Section 1.4 (7/98); NO_x emissions include a safety factor of 1.5 and PM₁₀ emissions have been adjusted for emissions of H₂SO₄;

- SO₂ - an average concentration of 282 ppmw H₂S in the blowstill gases and 96.34% combustion efficiency; approximately 1.8% of SO₂ emissions will be emitted as SO₃ and converted to H₂SO₄;
- 4 Actual emissions from combustion of the sour water stripper gases are based on a water flow rate of 121.6 gpm, a gas flow rate of 3.86 SCF/gallon, and the following:
NO_x - an average concentration of 1,178 ppmw NH₃ in the sour water, 100% collection efficiency, and 63.85% combustion efficiency with approximately 37.31% being converted to NO₂ and 26.83% being converted to N₂O emissions;
CO & VOC - no emissions were calculated and are considered insignificant;
PM₁₀ - emissions of PM have been adjusted for emissions of H₂SO₄;
SO₂ - an average concentration of 3,117 ppmw H₂S in the sour water, 100% collection efficiency, and 96.34% combustion efficiency; approximately 1.8% of SO₂ emissions will be emitted as SO₃ and converted to H₂SO₄.
- 5 Emissions from combustion of the auxiliary fuel in the blowstill are based on an average fuel usage of 121.6 MMSCFY, a heating value of 867 BTU/SCF, and the following:
NO_x, CO, PM₁₀, & VOC - AP-42, Section 1.4 (7/98); NO_x emissions include a safety factor of 1.5;
SO₂ - A fuel-gas H₂S concentration of 159 ppmv.
- 6 Emissions from H-602 are based on an average fuel usage of 212.0 MMSCFY, a heating value of 867 BTU/SCF, and the following:
NO_x, CO, PM₁₀, & VOC - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv.
- 7 Emissions from the flare are based on an average auxiliary fuel usage of 135.0 MMSCFY, a heating value of 2,377 BTU/SCF, and the following:
NO_x, CO, & VOC - AP-42, Section 13.5 (1/95);
PM₁₀ - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv.
- 8 Actual emissions for wastewater operations are based on a component counts and the WATER9 program.
- 9 Actual emissions from the sulfur railcar loading operations are based on a H₂S concentration of 8,000 ppmv (based on historical analyses of sulfur pit sweep vapors ~2,000 ppmv plus a safety factor of four), an annual average production rate of 49 LTD, and the density of molten sulfur (124.8 lb/SCF).
- 10 Actual emissions for the sulfur storage pit are based on a H₂S concentration of 8,000 ppmv (based on historical analyses of sulfur pit sweep vapors ~2,000 ppmv plus a safety factor of four), an annual average production rate of 49 LTD, and the density of molten sulfur (124.8 lb/SCF).
- 11 Potential emissions from the SRU incinerator are based on the following:
NO_x, CO, PM₁₀, VOC - For emissions from combustion of the auxiliary fuel, emissions were based on a heat rating of 8.2 MMBTUH and the emission factor from AP-42, Section 1.4 (7/98); for emissions from combustion of the waste gas, emissions were based on a flow rate of 217,512 SCFH of waste gas, a heat content of 23 BTU/SCF, and the emission factor from AP-42, Section 1.4 (7/98); NO_x emissions include a safety factor of 1.5 and PM₁₀ emissions have been adjusted for emissions of H₂SO₄;
SO₂ - Based on the NSPS, Subpart J, SO₂ emission limit of 250 ppmv and a flow rate of 288,212 DSCFH @ 0% O₂; approximately 1.8% of SO₂ emissions will be emitted as SO₃ and converted to H₂SO₄;
- 12 Potential emissions from the Asphalt Blowstill are based on the following:
NO_x - For emissions from combustion of the auxiliary fuel, emissions were based on a heat rating of 12 MMBTUH and the emission factor from AP-42, Section 1.4 (7/98) multiplied by 1.5; for emissions from combustion of the waste gas, emissions were based on a flow rate of 21,287 lb/hr of waste gas, a heat content of 2,363 BTU/lb, and the emission factor from AP-42, Section 1.4 (7/98) multiplied by 1.5; for emissions from nitrogen in the waste gas (as NO₂), emissions were based on a concentration of 6.2 ppmv and a flow rate of 276,294 SCFH.
CO & VOC, & PM₁₀ - For emissions from combustion of the auxiliary fuel, emissions were based on a heat rating of 12 MMBTUH and AP-42, Section 1.4 (7/98); for emissions from combustion of the waste gas, emissions were based on a flow rate of 21,287 lb/hr of waste gas, a MW of 29 lb/lb-mole, a ratio of 379 SCF/lb-mole, and AP-42, Section 1.4 (7/98); emissions of PM have been adjusted for emissions of H₂SO₄.
SO₂ - A refinery fuel-gas H₂S concentration of 159 ppmv, a flow rate of 0.016 MMSCFH of auxiliary fuel, and a flow rate of 0.276 MMSCFH of waste gas; approximately 1.8% of SO₂ emissions will be emitted as SO₃ and converted to H₂SO₄;

- 13 Emissions from heater H-603 are based on a heat input rating of 125.5 MMBTUH and the following:
NO_x - Mfg. data - 0.066 lb/MMBTU;
CO - Stack tests & performance data - 42.3 lb/MMSCF;
PM₁₀ & VOC - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a heating value of 800;
- 14 Emissions from heater H-6501 are based on a heat input rating of 92.1 MMBTUH and the following:
NO_x - Mfg. data - 0.0600 lb/MMBTU;
CO - Stack tests & performance data - 0.0404 lb/MMBTU;
PM₁₀ & VOC - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a heating value of 800 BTU/SCF;
- 15 Emissions from heater H-6502 are based on a heat input rating of 54.3 MMBTUH and the following:
NO_x - Mfg. data - 0.0600 lb/MMBTU;
CO - Stack tests & performance data - 0.0404 lb/MMBTU;
PM₁₀ & VOC - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a heating value of 800 BTU/SCF;
- 16 Emissions from heater H-15001 are based on a heat input rating of 326.8 MMBTUH and the following:
NO_x - Mfg. data - 0.037 lb/MMBTU;
CO - Stack tests & performance data - 0.030 lb/MMSCF;
PM₁₀ & VOC - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a heating value of 800 BTU/SCF;
- 17 Emissions from the West Flare HI-803 are based on a heat input rating of 28 MMBTUH and the following:
NO_x, CO, & VOC - AP-42, Section 13.5 (1/95);
PM₁₀ - AP-42, Section 1.4 (7/98);
SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a heating value of 800 BTU/SCF;
- 18 Emissions from T-83001 are based on TANKS4.0 a throughput of 2,565,500 bbl/yr and a vapor pressure of 0.105 psia.
- 19 Actual and potential emissions for fugitive equipment leaks are the same due to the fact that they are based only on equipment counts. Therefore, only added fugitive equipment emissions are reviewed for inclusion in the netting analysis.
- 20 Potential emissions for wastewater operations are based on a component counts and the WATER9 program.
- 21 Potential emissions from the sulfur railcar loading operations are based on a H₂S concentration of 8,000 ppmv (based on historical analyses of sulfur pit sweep vapors ~2,000 ppmv plus a safety factor of four), a loading rate of 100,000 lb/hr of molten sulfur per railcar, one loading station, and the density of molten sulfur (124.8 lb/SCF).
- 22 Potential emissions for sulfur storage pit are based on a H₂S concentration of 8,000 ppmv (based on historical analyses of sulfur pit sweep vapors ~2,000 ppmv plus a safety factor of four), the run-down rate of 11,458 lb/hr of molten sulfur (125 LTD), and the density of molten sulfur (124.8 lb/SCF).

Emissions from the East Flare from Permit No. 98-172-C (PSD)

The table below details the emissions for the east flare after the 1976 reconstruction and applicability of NSPS, Subpart J.

NO _x		CO		PM ₁₀		SO ₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1.84	8.04	9.99	43.76	0.25	1.10	0.91	3.97	3.78	16.56

Potential emissions are based on a 27 MMBTUH flare operating at 100% capacity 8,760 hours per year with a maximum sulfur content of 159 ppm H₂S (NSPS, Subpart J limitation) and AP-42 (1/95), Section 13.5.

Emissions from the Reformer CCR

The table below details the emissions for the Reformer CCR as authorized by Permit No. 98-265-O.

NO _x		CO		PM ₁₀		SO ₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
0.83	3.65	0.12	0.54	0.39	1.73	0.47	2.04	0.03	0.14

Emissions are based on a coke-burning rate of 49 lbs/hr, which is equivalent to a maximum catalyst recirculation rate of 700 lb/hr and a coke generation rate of 7% of the catalyst weight, with a coke maximum sulfur content of 0.5% by weight. Coke combustion emissions were based on AP-42 (1/95), Section 1.1, for sub-bituminous coal combustion. PM₁₀ emissions also include a recovery factor for the catalyst of 99.99%. The following factors were selected for emission estimates since there are no factors for coke combustion.

NO_x - 34 lb/ton of coke combusted (Pulverized coal fired, wet bottom);

CO - 5 lb/ton of coke combusted (Spreader Stoker);

PM₁₀ - 13.2 lb/ton of coke combusted (Spreader Stoker) & 0.07 lb/hr catalyst;

SO₂ - 38 x (Sulfur Content) lb/ton of coke combusted (Spreader Stoker);

VOC - 1.3 lb/ton of coke combusted (Underfeed Stoker).

Ethylene dichloride (C₂H₄Cl₂) is injected into the Reformer and is discharged as hydrogen chloride (HCl). Ethylene dichloride is almost completely destroyed by reaction with the catalyst and air. Permit No. 98-265-O also limited emissions of HCl (1.49 lb/hr) and usage of ethylene dichloride in the Reformer (17.2 TPY). If all of the chloride were converted to HCl, this would result in approximately 2.89 lb/hr of HCl or approximately twice the amount of the HCl emission limit of 1.49 lb/hr. The error in the material usage limit was due to calculations that estimated only one mole of chloride was generated per mole of ethylene dichloride. The usage of ethylene dichloride should have been limited to approximately 8.87 TPY. This permit corrects the material usage limit to a limit that is equivalent to the estimated emissions. Emissions of HCl were originally based on test results that showed that the HCl flow from the Reformer CCR was 0.2% of the total flow with a 50% safety factor. The flow of the Reformer was originally estimated at 200 actual cubic feet per minute (ACFM) at a temperature of 800 °F (~5,214 standard cubic feet per hour (SCFH)) to give a flow of 13.72 lb-moles/hr.

Emissions from the FCCU Operation as Constructed and Modified

The table on the following page shows the emissions prior the 1981 FCCU construction, after the construction, subsequent changes in emission after the modification, and after the PSD/BACT review. The 1981 refurbishment basically incorporated the construction of a completely new FCCU. A few of the vessels from the existing FCCU were converted to catalyst storage vessels. The ability to process FCCU feedstock was increased from 20,000 bbl/day to 25,000 bbl/day.

Estimated associated emission increases for the FCCU following the 1981 construction activities are provided along with the post-PSD review emissions. The incremental coke burning capability increased to approximately 19,000 lbs/hr due to the ability to vary the assay characterization of crude feedstocks. Based on a current day analysis of coke production, the FCCU processes approximately 18,000 lbs of coke per hour at a feed-rate of 27,000 bbl/day. Pre-PSD review potential emissions changes are presented as a total, which includes all emission changes since 1974. The emissions for the FCCU following the 1981 construction are based on

an increase of the feed to the FCCU from 25,000 bbl/day to 27,550 bbl/day and the subsequent modification, which increased the throughput to 30,000 bbl/day.

	TPY NO _x	TPY CO	TPY PM ₁₀	TPY SO ₂
PTE Pre-mod.^{1, 2}	363.0	43.5	147.5	309.5
PTE Post-mod.^{3, 4} (25,000 bbl/day)	571.7	556.4	284.4	627.6
Change in PTE	208.7	512.9	136.9	318.1
Pre-PSD Review Changes				
PTE & Ass. Increases ^{5, 4} (27,550 bbl/day)	711.1	603.7	312.5	822.9
PTE & Ass. Increases ^{6, 4} (30,000 bbl/day)	761.0	649.2	339.6	892.7
Cumulative Change in PTE	398.0	605.7	192.1	583.2
PTE Post-PSD Review⁷	452.0	96.2	50.4	219.6

¹ Emissions are based on a 20,000 bbl/day FCCU feed rate with a sulfur content of 0.2% by weight, material and energy balances from a process design dated July 16, 1973, and the factors shown below. The FCCU regenerator was a complete burn regenerator that reduced CO emissions from the regenerator to what an incinerator would provide. The design specification for the 1974 permit was a coke burn rate of 11,000 lbs/hr and 8,520 hours of operation per year.

NO_x - Factor Information Retrieval (FIRE) emission factor for coke burning of 14.0 lbs/ton of coke burned;

CO - FIRE emissions factor for coke burning of 0.6 lbs/ton of coke burned;

PM₁₀ - taken directly from the application for Permit No. 74-171-C.

SO₂ - 6.24 lbs/1,000 lbs of coke burned;

² Emissions from heater H-201 are based on a HHV of 83.8 MMBTUH and the following:

NO_x, CO, & PM₁₀ - AP-42, Section 1.4 (7/98);

SO₂ - A fuel-gas H₂S concentration of 159 ppmv.

³ Emissions from the FCCU are based on a 25,000 bbl/day FCCU feed rate with a sulfur content of 0.3% by weight, a coke burn rate of 13,750 lbs/hr, and the following factors:

NO_x - FIRE emission factor for coke burning of 14.0 lbs/ton of coke burned;

CO - NSPS, Subpart J allowable of 500 ppmv and an estimated flow rate of 47,835 SCFM;

PM₁₀ - FIRE emission factor for FCCU operations of 242 lbs of PM per 1,000 bbl of feed corrected for an estimated 75% control efficiency for operation of the tertiary cyclones;

SO₂ - 9.8 lbs/1,000 lbs of coke burned.

⁴ Emissions from the heaters and incinerator are based on their HHV: H-201 (105 MMBTUH), H-252 (60 MMBTUH), H-253 (75 MMBTUH), and H-251 (15 MMBTUH); and the following:

NO_x - AP-42, Section 1.4 (7/98); H-201 - 190 lb/MMSCF, H-252, H-253, and H-251 - 100 lb/MMSCF;

CO & PM₁₀ - AP-42, Section 1.4 (7/98);

SO₂ - A fuel-gas H₂S concentration of 159 ppmv.

⁵ Emissions from the FCCU are based on an increase of the FCCU feed rate to 27,550 bbl/day with a sulfur content of 0.3% by weight, a coke burn rate of 18,229 lbs/hr, and the following factors:

NO_x - FIRE emission factor for coke burning of 14.0 lbs/ton of coke burned;

CO - NSPS, Subpart J allowable of 500 ppmv and an estimated flow rate of 52,714 SCFM;

PM₁₀ - FIRE emission factor for FCCU operations of 242 lbs/1,000 bbl of feed corrected for an estimated 75% control efficiency for operation of the tertiary cyclones;

SO₂ - 9.8 lbs/1,000 lbs of coke burned.

- 6 Emissions from the FCCU are based on an increase of the FCCU feed rate to 30,000 bbl/day with a sulfur content of 0.3% by weight, a coke burn rate of 19,926 lbs/hr, and the following factors:
 NO_x - FIRE emission factor for coke burning of 14.0 lbs/ton of coke burned;
 CO - NSPS, Subpart J allowable of 500 ppmv and an estimated flow rate of 57,402 SCFM;
 PM₁₀ - FIRE emission factor for FCCU operations of 242 lbs/1,000 bbl of feed corrected for an estimated 75% control efficiency for operation of the tertiary cyclones.
 SO₂ - 9.8 lbs/1,000 lbs coke burned;
- 7 Proposed and accepted BACT Emissions for the FCCU:
 NO_x Emissions:
 Hydrotreatment of the FCCU feedstock and LNB in the CO boiler was proposed and accepted as BACT. The BACT emission limit for the FCCU regenerators is 356.8 TPY. To meet this standard, in addition to hydrotreatment of the feedstock, provided with variable assays of crude oil feedstock to the refinery, it will first be necessary to minimize NO_x formation by excess air monitoring and control. If the emissions standard cannot be achieved, it will then be necessary to install additional NO_x controls on the FCCU flue gas stream. Air preheaters H-252 and H-253 are vented through the FCCU and emissions are incorporated into the BACT limit. The federally enforceable emission limits requested for H-201 the FCCU Feedstock preheater is 95.2 TPY (149 lb/MMSCF @ 800 BTU/SCF).
 CO Emissions:
 Use of a CO Boiler/Incinerator for the FCCU No. 1 Regenerator and high temperature regeneration for the FCCU No. 2 Regenerator was proposed and accepted as BACT. The BACT emission limit for the FCCU regenerators is 54.1 TPY. H-252 and H-253 are vented through the FCCU and emissions are incorporated into the BACT limit. CO emissions for H-201 are estimated at 42.1 TPY using AP-42, Section 1.4 (7/98).
 PM₁₀ Emissions:
 Installation of a WS to control PM₁₀ emissions from the FCCU regenerators was proposed and accepted as BACT. The BACT emission limit for the FCCU regenerators is 46.6 TPY. H-252 and H-253 are vented through the FCCU and emissions are incorporated into the BACT limit. PM₁₀ emissions for H-201 are estimated at 3.8 TPY using AP-42, Section 1.4 (7/98).
 SO₂ Emissions:
 Installation of a WS to control SO₂ emissions from the FCCU regenerators was proposed and accepted as BACT. The BACT emission limit for the FCCU regenerators is 202.4 TPY. The emissions were evaluated using a feedstock sulfur concentration of 0.3% by weight. The weight % sulfur in FCCU feed can be greater than 0.3% after installation of the scrubber; however, SO₂ emissions from the scrubber shall not exceed the limit of 193 TPY. This can be achieved by increasing the scrubber performance when necessary if the weight % sulfur in the FCCU feed is above 0.30%. H-252 and H-253 are vented through the FCCU and emissions are incorporated into the BACT limit. SO₂ emissions for H-201 are estimated at 17.2 TPY using the NSPS, Subpart J, allowable of 159 ppmv.

Emissions from the FCCU as Evaluated in the BACT Submittal

The table below shows the emissions as they were evaluated in the proposed and accepted BACT submittal. The baseline emissions and the proposed BACT limits do not include the FCCU feedstock pre-heater.

	TPY NO _x	TPY CO	TPY PM ₁₀	TPY SO ₂
Baseline Emissions¹	473.1	229.1	466.4	2,024.7
BACT Emission Limits²	356.8	54.1	46.6	202.4
Emission Reductions	116.3	175.0	419.8	1,822.3

- ¹ Baseline emissions for the FCCU are based on the following:

NO_x Emissions:

NO_x emissions from the FCCU No. 1 Regenerator were based on stack test results (65.34 lb/hr) conducted on January 22-23, 1998, and extrapolated from a feedstock rate of 25,836 bbl/day to 30,000 bbl/day. NO_x emissions from the FCCU No. 2 Regenerator were based on stack test results (27.69 lb/hr) conducted on January 22-23, 1998, and extrapolated from a feedstock rate of 25,836 bbl/day to 30,000 bbl/day.

CO Emissions:

CO emissions from the FCCU No. 1 Regenerator were based on an average of stack test results (89.28, 16.96, 26.49 lb/hr) conducted on January 22-23, 1998, August 9, 1999, and August 12, 1999, and extrapolated from feedstock rates of 25,836, and 22,050, 26,322 bbl/day, respectively, to 30,000 bbl/day. CO emissions from the FCCU No. 2 Regenerator were based on the detection limit for CO based on stack test results conducted on January 22-23, 1998.

PM₁₀ Emissions:

PM₁₀ emissions from the FCCU No. 1 Regenerator were based on stack test results (52.56r) conducted on August 12 1999, and extrapolated from a feedstock rate of 26,322 bbl/day to 30,000 bbl/day. PM₁₀ emissions from the FCCU No. 2 Regenerator were based on stack test results (40.87 lb/hr) conducted on August 12, 1999, and extrapolated from a feedstock rate of 26,322 bbl/day to 30,000 bbl/day.

SO₂ Emissions:

SO₂ emissions from the FCCU No. 1 Regenerator were based on stack test results (246.18 lb/hr) conducted on January 22-23, 1998, and extrapolated from a feedstock rate of 25,836 bbl/day and a feedstock sulfur content of 0.2733% by weight to 30,000 bbl/day and a feedstock sulfur content of 0.3% by weight. NO_x emissions from the FCCU No. 2 Regenerator were based on stack test results (112.35 lb/hr), which was conducted on August 12, 1999, extrapolated from a feedstock rate of 26,322 bbl/day and a feedstock sulfur content of 0.2587% by weight to 30,000 bbl/day and a feedstock sulfur content of 0.3% by weight.

- ² BACT emission limits for the FCCU are based on the following:

NO_x Emissions:

NO_x emissions from the FCCU No. 1 Regenerator were based were based on a 35% reduction of baseline emissions. NO_x emissions from the FCCU No. 2 Regenerator were based on the baseline emission estimates.

CO Emissions:

CO emissions from the FCCU No. 1 Regenerator were based on a 78% reduction of baseline emissions. CO emissions from the FCCU No. 2 Regenerator were based on 99% reduction of the NSPS baseline emissions, which are based on a limit of 500 ppmdv a flow rate of 47,712 SCFM, and a moisture content of 8.5%.

PM₁₀ Emissions:

PM₁₀ emissions from the FCCU No. 1 and No. 2 Regenerators were based on a 90% reduction of baseline emissions (front-half).

SO₂ Emissions:

SO₂ emissions from the FCCU No. 1 and No. 2 Regenerators were based on a 90% reduction of baseline emissions.

Emissions from the FCCU After Application of CO Boiler SEP

The table below shows the emissions as the emissions from the FCCU after application of the proposed and accepted supplemental environmental project of replacing the existing FCCU No. 1 Regenerator CO Boiler/Incinerator with a larger CO Boiler that would be able to handle the total flow of the FCCU No. 1 Regenerator. The existing CO Boiler and Incinerator will be removed from service.

	TPY NO _x	TPY CO	TPY PM ₁₀	TPY SO ₂
BACT Emission Limits	356.8	54.1	46.6	202.4
SEP Emission Estimates¹	179.9	54.1	46.6	202.4
Emission Reductions	176.9	0.0	0.0	0.0

¹ SEP emissions estimates remain the same as the BACT emission limits for the FCCU, except for NO_x emissions, which are based on an 81.9% reduction of the FCCU No. 1 BACT emission limits. NO_x emissions from the FCCU No. 2 Regenerator remained the same.

PM Emissions from the Catalyst Hoppers

The table below summarizes PM emissions prior to the 1981 modification of the catalyst hopper system for the FCCU, after the modification, subsequent modifications, and after the PSD BACT review. A PM₁₀ emission limitation of 2 TPY was requested for the Catalyst Hoppers so that the emission limitation would be consistent with the proposed BACT.

	TPY PM	TPY PM ₁₀
PTE Pre-Construction¹	61.3	24.5
PTE Post-Construction²	98.8	40.2
Change in PTE	37.5	15.7
Pre-BACT PTE³	29.6	20.1
Post-PSD/BACT PTE⁴	2.0	2.0

- ¹ Potential emissions before 1981 are based on a continuous catalyst recirculation rate of approximately 1,400,000 lbs/hr through two hoppers at a FCCU processing rate of 20,000 bbl/day. Emissions are estimated utilizing an emission factor of 0.01 lbs PM/ton (AP-42, Section 11.24 (1/95), Table 11.24.2, high moisture ore, material handling and transfer - all minerals except bauxite) and continuous operation. PM₁₀ emissions are 40% of PM emissions. The high moisture ore factor was utilized since live steam is injected to control emissions of PM.
- ² Potential emissions after 1981 are based on a continuous catalyst recirculation rate of approximately 2,100,000 lbs/hr through two spent catalyst hoppers and the emission factor above in ⁽¹⁾; a fresh catalyst hopper with a maximum transfer rate of approximately 13 tons/hr, an emission factor of 0.12 lbs PM/ton (AP-42, Section 11.24 (1/95), Table 11.24.2, low moisture ore, material handling and transfer - all minerals except bauxite), and continuous operation. PM₁₀ emissions for the low moisture ore are 50% of PM emissions.
- ³ Potential emissions were based on the information in ⁽²⁾ and installation of cyclones to control emissions. The control efficiency of the cyclones was assessed as a minimum of 70% for PM and 50% for PM₁₀.
- ⁴ Potential emissions estimates include the existing operation of cyclones with steam-injection in conjunction with a WS to be installed to control PM. PM is assessed to be the same as PM₁₀ at the WS outlet.

Emissions from Operation of the CO Boiler

The CO boiler was rated 92 at MMBTUH by Zurn Industries based on a design performance summary sheet dated September 7, 1984. The primary design basis for the boiler was firing 110,000 lb/hr of the FCCU No. 1 regenerator's off-gas and 1,700 lb/hr of refinery fuel-gas. The secondary design basis was firing 0.1283 MMSCFH of refinery fuel-gas. The table below summarizes emissions for criteria pollutants for the CO boiler operation. The emissions shown below only represent the emissions arising from operation of the boiler itself and not the criteria pollutant emissions processed through the boiler. This CO boiler will be removed from service due to installation of the new CO boiler. These emissions are for historical review purposes only.

	TPY NO _x	TPY CO	TPY SO ₂	TPY PM ₁₀
PTE Pre-PSD¹	40.0	33.0	13.4	3.0
Post-PSD/BACT PTE²	12.1	33.0	13.4	3.0

¹ Emissions are based on a heat input rating of 92 MMBTUH and the following:

NO_x, CO, & PM₁₀ - AP-42, Section 1.4 (7/98);

SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a firing rate of 0.1283 MMSCFH of refinery fuel gas.

² All emissions remained the same except for NO_x emissions, which are now based on factors for LNB (~ 0.03 lb/MMSCF).

Emissions from the Crude Unit Indirect-Fired Heat Exchangers H-102A & H-102B

Provided below is a summary of the emissions of criteria pollutants for H-102A and H-102B prior to the 1990 modification, after the 1990 modification, and after the PSD BACT review.

	TPY NO _x	TPY CO	TPY PM ₁₀	TPY SO ₂	TPY VOC
PTE Pre-mod.¹					
H-102A	120.2	36.1	3.3	14.7	2.4
H-102B	27.1	22.7	2.1	9.3	1.5
Sub-Total	147.3	58.8	5.4	24.0	3.9
PTE Post-mod.²					
H-102A	130.5	57.7	8.5	23.5	3.8
H-102B	110.1	48.7	4.4	19.8	3.2
Sub-Total	240.6	106.4	12.9	43.3	7.0
Change in PTE	93.3	47.6	7.5	19.3	3.1
Post-PSD/BACT PTE³					
H-102A	31.5	57.7	8.5	23.5	3.8
H-102B	34.9	48.7	7.2	19.8	3.2
Sub-Total	66.4	106.4	15.7	43.3	7.0

¹ Emissions are based on a heat input rating of 100 and 63 MMBTUH for heaters H-102A & H-102B, respectively, and the following:

NO_x, CO, & PM₁₀, VOC - AP-42, Section 1.4 (7/98);

- SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a HHV of 800 BTU/SCF.
- ² Emissions are based on a heat input rating of 160 and 135 MMBTUH for heaters H-102A & H-102B, respectively, and the following:
- NO_x, CO, & VOC - AP-42, Section 1.4 (7/98);
- PM₁₀ - 1.63 times AP-42, Section 1.4 (7/98);
- SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a HHV of 800 BTU/SCF.
- ³ Emissions are based on a heat input rating of 160 and 135 MMBTUH for heaters H-102A & H-102B, respectively, and the following:
- NO_x - BACT determinations and ultra-low NO_x burners
- H-102A - 0.045 lb/MMBTU; H-102B - 0.059 lb/MMBTU;
- CO & VOC - AP-42, Section 1.4 (7/98);
- PM₁₀ - 1.63 times AP-42, Section 1.4 (7/98);
- SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a HHV of 800 BTU/SCF.

Fugitive Emissions for the Amine Unit (Area 550)

The table below summarizes emissions from the Amine Unit after the 1993 modification and after application of a leak detection and repair (LDAR) program.

	TPY VOC	TPY H ₂ S ²	TPY SO ₂ ²
Post-Mod & LDAR PTE¹	13.2	2.5	3.8

- ¹ Post-modification potential emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000-ppm as provided for in NSPS, Subpart GGG. Potential emissions include a 95% destruction efficiency for PRV(s) routed to flares.
- ² Emissions of H₂S are based on an overall unit wide concentration of 24,000 ppm of vented emissions not routed to a flare. SO₂ emissions are based on the venting of a 24,000 ppm H₂S vapor PRV to the flare.

Fugitive Emissions for the NHT (Area 400), Platformer (Area 400), and Isom (Area 450)

The table below summarizes emissions for the NHT, Platformer, and Isom units fugitive equipment leaks after application of a LDAR program.

	TPY VOC
Post-Mod & LDAR PTE	78.8

Post-modification potential emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000-ppm as provided for in NSPS, Subpart GGG. Potential emissions include a 95% destruction efficiency for PRV(s) that are routed to the flares and Tandem-seal compressor arrangements.

Crude Unit Fugitive Equipment Leaks (Area 100)

The table below summarizes emissions for the crude unit area fugitive equipment leaks after the 1990 modification and application of a LDAR program.

	TPY VOC
Post-Mod & LDAR PTE	261.3

Post-modification potential emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000 ppm as provided for in Title 40 CFR Part 60, Subpart GGG. This is equivalent to an overall control efficiency for valves of approximately 62 to 70% from the average refinery emissions factors.

Crude Unit Area Wastewater Treatment System Fugitive Equipment Leaks (ASU)

The table below summarizes emissions for the crude unit area wastewater treatment fugitive equipment leaks after the 1990 modification and application of a LDAR program.

	TPY VOC
Post-Mod & LDAR PTE	23.9

Implementation of Title 40 CFR Part 60, Subpart QQQ, reduces emissions to a certain degree, but the extent is minute compared the end-of-line release from aerated biological reactors. The effectiveness of Subpart QQQ provides a greater reduction of VOC emissions when implemented in conjunction with Title 40 CFR Part 61, Subpart FF.

Fugitive Emissions for the Alkylation Unit (Area 900)

The table below summarizes emissions for the alkylation unit fugitive equipment leaks after the 1991 modification and application of LDAR.

	TPY VOC
Post-Mod & LDAR PTE	92.8

Post-modification potential emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000-ppm as provided for in NSPS, Subpart GGG. Potential emissions include a 95% destruction efficiency for PRV(s) that are routed to the flares.

Fugitive Emissions for the Saturated Gas Plant Unit (Area 300)

The table below summarizes emissions for the saturated gas plant fugitive equipment leaks after construction in 1993 and application of LDAR.

	TPY VOC
Post-Mod & LDAR PTE	107.9

Post-modification potential emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000-ppm as provided for in NSPS, Subpart GGG. Potential emissions include a 95% destruction efficiency for 13 PRV(s) routed to flares; whereas the remainder are atmospherically vented.

Fugitive Emissions for the Olefin Treating Unit (Area 250)

The table below summarizes emissions for the olefin treating unit fugitive equipment leaks after the 1994 modification and application of LDAR.

	TPY VOC
Post-Mod & LDAR PTE	31.2

Post-modification potential emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000-ppm as provided for in NSPS, Subpart GGG.

Emissions from Fugitive Equipment Leaks Associated with H-100024

The table below summarizes emissions from the fugitive equipment leaks associated with the operation of hot oil heater H-100024 after application of LDAR.

	TPY VOC
Post-Mod & LDAR PTE	3.5

Post-NSPS emissions are based on present day equipment counts evaluated at LDAR screening values of a maximum 10,000-ppm as provided for in NSPS, Subpart GGG.

Emissions for the Diesel-Fired Emergency Air Compressor C-80018

The table below details the emissions for the 450-hp Detroit Diesel 8V-92TA diesel-fired emergency air compressor as authorized by Permit No. 98-229-O and updated to reflect current operations.

NO _x		CO		PM ₁₀		SO ₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
13.95	27.90	3.01	6.01	0.99	1.98	0.18	0.36	1.13	2.26

Emissions are based on 4,000 hours of operation per year a rating of 450-hp and the following factors:

NO_x, CO, & PM₁₀, VOC - AP-42, Section 3.3, (10/96);

SO₂ - AP-42, Section 3.4, (10/96) and a maximum sulfur content of 0.05% by weight;

Emissions for the Diesel-Fired Emergency Generators EEQ-8801 & EEQ-80001

The table below details the emissions for the 750-kW Detroit DMT D Model 16V92TA diesel-fired emergency generator (EEQ-8801) as authorized by Permit No. 97-523-O and updated to reflect current operations. Permit No. 97-523-O also authorized the operation of an 80-kW Onan DGDA emergency generator (EEQ-80001) with a Cummins 6BT5.9-G1 diesel engine. Emissions for this engine are also included below.

	NO _x		CO		PM ₁₀		SO ₂		VOC	
EEQ	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8801	28.80	11.52	7.65	3.06	0.52	0.21	0.45	0.18	0.74	0.29
80001	9.16	3.66	1.97	0.79	0.64	0.26	0.10	0.04	0.75	0.30

Emissions are based operating 800 hours per year, a maximum fuel input of 461.5 and 106.5 lbs/hr at 19,500 BTU/lb, or 9.00 and 2.08 MMBTUH for generators EEQ-8801 & EEQ-80001, respectively and the following factors:

NO_x, CO, & PM₁₀, VOC - AP-42, Section 3.3 & 3.4, (10/96) for EEQ-8801 & EEQ-80001, respectively;

SO₂ - AP-42, Section 3.4, (10/96) and a maximum sulfur content of 0.05% by weight.

Emissions from the Gasoline and Diesel Loading Dock Vapor Incinerator

The table below quantifies emissions for the vapor incinerator at maximum capacity.

	TPY NO _x	TPY CO	TPY PM ₁₀	TPY SO ₂	TPY VOC
PTE Pre-mod.¹	----	----	----	----	396.0
PTE Post-mod.²	15.8	39.5	<0.01	0.01	73.66
Change in PTE	15.8	39.5	0.0	0.01	-322.3

- ¹ Emission estimates were based on an average of emissions from 1993, 1995, and 1995, for the loading dock. During this time the facility loaded an average of 2,339,930 bbl/yr of regular unleaded gasoline, 426,207 bbl/yr of premium unleaded gasoline, and 1,173,125 bbl/yr of diesel fuel.
- ² VOC emissions from the vapor combustor are based on a loading 22,525,714 bbl/yr and 155,782 gal/hr of gasoline and diesel and a limit of 10 mg VOC/L gasoline loaded. Fugitive VOC emissions from loading losses are based on loading loss emission calculations and a collection efficiency of 99.2% for gasoline. Annual loading losses were based on loading 22,525,714 bbl/yr of gasoline, AP-42 (1/95), Section 5.2, a saturation factor of 1.0, a vapor pressure (vp) of 5.8 psia, a temperature of 60 °F, and a vapor molecular weight of 65. Hourly loading losses were based on loading 155,782 gallons per hour (gph) of gasoline, AP-42 (1/95), Section 5.2, a saturation factor of 1.0, a maximum vp of 9.4 psia, a maximum temperature of 93 °F, and a vapor molecular weight of 65. NO_x, CO, and SO₂ emissions from the vapor combustor are based on the following emission factors:
 NO_x - 4 mg/L of gasoline loaded (0.03338 lb/Mgal);
 CO - 10 mg/L of gasoline loaded (0.08345 lb/Mgal);
 SO₂ - Combustion of 2,000 gallons of distillate fuel oil and a factor of 7.1 lb/Mgal.

Emissions from Heaters H-403, H-404, H-405, H-406, H-401A, H-401B, H-402A, H-402B, H-407, H-411, H-100024, and H-210001, and Boilers B-802 and B-803

The table below and on the following page details the emissions for the heaters and boilers listed above.

	NO _x		CO		PM ₁₀		SO ₂		VOC	
Heaters	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
H-403	9.68	42.38	8.13	35.60	0.74	3.22	3.32	14.53	0.53	2.33
H-404	4.76	20.83	3.99	17.49	0.36	1.58	1.63	7.14	0.26	1.15
H-405	4.98	21.81	4.18	18.32	0.38	1.66	1.71	7.48	0.27	1.20
H-406	2.75	12.02	2.31	10.10	0.21	0.91	0.94	4.12	0.15	0.66
H-401A	1.57	6.87	1.32	5.77	0.12	0.52	0.54	2.35	0.09	0.38
H-401B	1.45	6.36	1.22	5.34	0.11	0.48	0.50	2.18	0.08	0.35
H-402A	1.36	5.97	1.15	5.01	0.10	0.45	0.47	2.05	0.08	0.33
H-402B	1.55	6.79	1.30	5.70	0.12	0.52	0.53	2.33	0.09	0.37
H-407	2.45	10.74	2.06	9.02	0.19	0.82	0.84	3.68	0.13	0.59
H-411	2.13	9.32	1.79	7.83	0.16	0.71	0.73	3.19	0.12	0.51
H-100024	0.68	2.96	1.11	4.87	0.10	0.44	0.45	1.98	0.07	0.32
H-210001	1.20	5.24	1.00	4.40	0.09	0.40	0.01	0.05	0.07	0.29
Boilers										
B-802	8.80	38.56	7.40	32.39	0.67	2.93	3.02	13.21	0.48	2.12
B-803	8.51	37.27	7.15	31.31	0.65	2.83	2.92	12.77	0.47	2.05

Emissions are based on the following heat input ratings HHV (MMBTUH) and emission factors:

H-403 - 98.7, H-404 - 48.5, H-405 - 50.8, H-406 - 28.0, H-401A - 16.0, H-401B - 14.8, H-402A - 13.9, H-402B - 15.8, H-407 - 25.0, H-411 - 21.7, H-100024 - 13.5, H-210001 - 12.2 B-802 - 89.8, B-803 - 86.8;

NO_x, CO, & PM₁₀, VOC - AP-42, Section 1.4 (7/98);

SO₂ - A fuel-gas H₂S concentration of 159 ppmv and a HHV of 800 BTU/SCF; For H-210001, a fuel-gas H₂S concentration of 4 ppmv was used.

POTENTIAL EMISSIONS PRIOR TO MODIFICATIONS

EU	NO _x		CO		PM ₁₀		SO ₂		VOC	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
T-1018	----	----	----	----	----	----	----	----	2.78	12.17
T-1019	----	----	----	----	----	----	----	----	5.50	24.08
T-1115	----	----	----	----	----	----	----	----	0.83	9.98
T-1116	----	----	----	----	----	----	----	----	0.83	9.97
T-1130	----	----	----	----	----	----	----	----	6.11	26.76
H-102B ¹	25.15	110.1	11.12	48.70	1.01	4.41	4.52	19.81	0.73	3.19
H-102A ¹	27.01	118.3	11.94	52.30	1.08	4.73	4.86	21.28	0.78	3.42
H-403	9.68	42.38	8.13	35.60	0.74	3.22	3.32	14.53	0.53	2.33
H-404	4.76	20.83	3.99	17.49	0.36	1.58	1.63	7.14	0.26	1.15
H-405	4.98	21.81	4.18	18.32	0.38	1.66	1.71	7.48	0.27	1.20
H-406	2.75	12.02	2.31	10.10	0.21	0.91	0.94	4.12	0.15	0.66
CU Flare	1.84	8.04	9.99	43.76	0.25	1.10	34.14	149.5	3.78	16.56
HI-801 ²	35.09	153.7	0.61	2.68	0.01	0.38	205.5	899.9	0.05	0.21
H-201	8.22	35.99	6.90	30.23	0.62	2.74	2.82	12.33	0.45	1.98
H-401A	1.57	6.87	1.32	5.77	0.12	0.52	0.54	2.35	0.09	0.38
H-401B	1.45	6.36	1.22	5.34	0.11	0.48	0.50	2.18	0.08	0.35
H-402A	1.36	5.97	1.15	5.01	0.10	0.45	0.47	2.05	0.08	0.33
H-402B	1.55	6.79	1.30	5.70	0.12	0.52	0.53	2.33	0.09	0.37
H-407	2.45	10.74	2.06	9.02	0.19	0.82	0.84	3.68	0.13	0.59
B-802	8.80	38.56	7.40	32.39	0.67	2.93	3.02	13.21	0.48	2.12
B-803	8.51	37.27	7.15	31.31	0.65	2.83	2.92	12.77	0.47	2.05
HI-81001 ²	1.90	8.34	10.36	45.38	0.21	0.87	0.94	4.12	3.92	17.17
H-15001 ²	10.85	47.53	8.80	38.54	1.32	5.78	3.80	16.63	0.80	3.51
LPLT	----	----	----	----	----	----	----	----	90.41	396.0
HI-251 ¹	75.87	332.3	52.31	229.1	52.56	230.2	313.8	1,374	----	Neg.
R-251 ¹	32.15	140.8	----	Neg.	40.87	179.1	140.4	650.4	----	Neg.
H-501 ²	1.22	5.36	0.17	0.75	0.01	0.16	7.81	34.20	0.03	0.14
EEQ8801 ³	28.80	11.52	7.65	3.06	0.52	0.21	0.45	0.18	0.74	0.29
EEQ80001 ³	9.16	3.66	1.97	0.79	0.64	0.26	0.10	0.04	0.75	0.30
Cat_Hop ¹	----	----	----	----	9.18	40.20	----	----	----	----
CCR ⁴	0.83	3.65	0.12	0.54	0.39	1.73	0.47	2.04	0.03	0.14
C-80018 ⁵	13.95	27.90	3.01	6.01	0.99	1.98	0.18	0.36	1.13	2.26
H-100024 ⁶	0.68	2.96	1.11	4.87	0.10	0.44	0.45	1.98	0.07	0.32
ASU	----	----	----	----	----	----	----	----	5.46	16.90
Area 100	----	----	----	----	----	----	----	----	176.0	771.0
Area 250	----	----	----	----	----	----	----	----	28.78	126.0
Area 300	----	----	----	----	----	----	----	----	35.78	156.7
Area 400	----	----	----	----	----	----	----	----	77.40	339.0
Area 500	----	----	----	----	----	----	0.98	4.31	3.25	14.24
Area 900	----	----	----	----	----	----	----	----	33.26	145.7
WW-500	----	----	----	----	----	----	----	----	3.22	14.10
TOTALS	320.6	1,220	166.3	682.8	113.4	490.2	737.6	3,263	485.5	2,124

¹ - Based on emissions from the BACT analysis.² - Based on emissions from Permit No. 95-506-O (M-1).³ - Based on emissions from Permit No. 97-523-O.⁴ - Based on emissions from Permit No. 98-265-O.⁵ - Based on emissions from Permit No. 98-229-O.⁶ - Based on emissions from Permit No. 98-172-C.

TOTAL POTENTIAL EMISSIONS AFTER MODIFICATIONS

EU	NO _x		CO		PM ₁₀		SO ₂		VOC	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
T-83001	----	----	----	----	----	----	----	----	4.00	6.20
T-1018	----	----	----	----	----	----	----	----	2.78	12.17
T-1019	----	----	----	----	----	----	----	----	5.50	24.08
T-1115	----	----	----	----	----	----	----	----	0.83	9.98
T-1116	----	----	----	----	----	----	----	----	0.83	9.97
T-1130	----	----	----	----	----	----	----	----	6.11	26.76
T-153	----	----	----	----	----	----	----	----	0.40	1.75
H-102B	7.97	34.90	11.12	48.70	1.64	7.19	4.52	19.81	0.73	3.19
H-102A	7.20	31.54	13.18	57.71	1.75	8.51	5.38	23.54	0.86	3.78
H-403	9.68	42.38	8.13	35.60	0.74	3.22	3.32	14.53	0.53	2.33
H-404	4.76	20.83	3.99	17.49	0.36	1.58	1.63	7.14	0.26	1.15
H-405	4.98	21.81	4.18	18.32	0.38	1.66	1.71	7.48	0.27	1.20
H-406	2.75	12.02	2.31	10.10	0.21	0.91	0.94	4.12	0.15	0.66
CU Flare	1.84	8.04	9.99	43.76	0.25	1.10	0.91	3.97	3.78	16.56
HI-801	9.46	41.13	5.63	23.06	0.69	3.00	7.70	33.97	0.34	1.47
H-201	21.74	95.21	9.61	42.09	0.87	3.81	3.92	17.17	0.63	2.76
H-401A	1.57	6.87	1.32	5.77	0.12	0.52	0.54	2.35	0.09	0.38
H-401B	1.45	6.36	1.22	5.34	0.11	0.48	0.50	2.18	0.08	0.35
H-402A	1.36	5.97	1.15	5.01	0.10	0.45	0.47	2.05	0.08	0.33
H-402B	1.55	6.79	1.30	5.70	0.12	0.52	0.53	2.33	0.09	0.37
H-407	2.45	10.74	2.06	9.02	0.19	0.82	0.84	3.68	0.13	0.59
B-802	8.80	38.56	7.40	32.39	0.67	2.93	3.02	13.21	0.48	2.12
B-803	8.51	37.27	7.15	31.31	0.65	2.83	2.92	12.77	0.47	2.05
H-411	2.13	9.32	1.79	7.83	0.16	0.71	0.73	3.19	0.12	0.51
HI-81001	1.90	8.34	10.36	45.38	0.21	0.91	0.94	4.12	3.92	17.17
H-603	8.28	36.28	5.21	22.80	0.94	4.10	4.22	18.47	0.67	2.96
H-6501	5.53	24.20	3.72	16.29	0.69	3.01	3.09	13.55	0.50	2.18
H-6502	3.26	14.27	2.19	9.61	0.41	1.77	1.82	7.99	0.29	1.28
H-15001	12.09	52.96	9.80	42.94	2.44	10.67	10.98	48.09	1.76	7.72
H-210001	1.20	5.24	1.00	4.40	0.09	0.40	0.01	0.05	0.07	0.29
LPLT	5.20	15.79	13.00	39.48	----	----	0.01	0.01	30.16	73.66
FGS-200	74.71	217.74	46.86	106.04	22.37	51.34	66.44	223.59	0.78	3.40
H-501	1.94	8.50	1.09	4.67	0.43	1.89	11.88	52.01	0.07	0.31
EEQ8801	28.80	11.52	7.65	3.06	0.52	0.21	0.45	0.18	0.74	0.29
EEQ80001	9.16	3.66	1.97	0.79	0.64	0.26	0.10	0.04	0.75	0.30
Cat_Hop	----	----	----	----	3.77	1.88	----	----	----	----
CCR	0.83	3.65	0.12	0.54	0.39	1.73	0.47	2.04	0.03	0.14
C-80018	13.95	27.90	3.01	6.01	0.99	1.98	0.18	0.36	1.13	2.26
H-100024	0.68	2.96	1.11	4.87	0.10	0.44	0.45	1.98	0.07	0.32
T-155	----	----	----	----	----	----	----	----	0.60	2.64
ASU	----	----	----	----	----	----	----	----	5.46	23.9
Area 100	----	----	----	----	----	----	----	----	59.66	261.3
Area 250	----	----	----	----	----	----	----	----	7.12	31.2
Area 300	----	----	----	----	----	----	----	----	24.63	107.9
Area 400	----	----	----	----	----	----	----	----	17.99	78.8
Area 500-550	----	----	----	----	----	----	0.87	3.80	9.82	43.01
Area 900	----	----	----	----	----	----	----	----	21.19	92.8
WW-500-520	----	----	----	----	----	----	----	----	3.90	17.09
TOTALS	265.7	862.8	198.6	706.1	43.0	120.8	141.5	549.8	220.9	901.6

TOTAL POTENTIAL CHANGES IN EMISSIONS AFTER MODIFICATIONS

	NO_x		CO		PM₁₀		SO₂		VOC	
EU	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Pre-Mod.	320.6	1,220	166.3	682.8	113.4	490.2	737.6	3,263	485.5	2,124
Post-Mod.	265.7	862.8	198.6	706.1	43.0	120.8	141.5	549.8	220.8	901.4
Changes	-54.9	-357.2	32.30	23.3	-70.4	-369.4	-596.1	-2,713	-264.7	-1,223

SECTION VI. PSD REVIEW

Over the years, TPI Petroleum, Inc. (TPI) has implemented numerous projects to improve the product quality and throughput at the Valero Ardmore Refinery. Based on a compliance analysis, TPI identified several historical modifications, which resulted in emissions increases that triggered PSD requirements. Therefore, the requirements of the PSD program were addressed for each of the modifications. Only projects for which there was a physical equipment modification were considered in the BACT analysis. The following modifications and associated pollutants were subject to full PSD analysis including BACT:

Facility Modification	Pollutants Subject to PSD review
FCCU Catalyst Receiving Hopper	PM ₁₀
Crude Unit Heater H-102B	NO _x
Crude Unit Heater H-102A	NO _x
Crude Unit Fugitive Emissions	VOC
FCCU No. 1 Regenerator and CO Boiler/Incinerator	NO _x , CO, SO ₂ , PM ₁₀
FCCU No. 2 Regenerator	NO _x , CO, SO ₂ , PM ₁₀

The existing refinery was among the industries defined as a PSD-major source at an emissions level of 100 TPY. Full PSD review of emissions consisted of the following:

- a determination of BACT;
- an evaluation of existing air quality and a determination concerning monitoring requirements;
- an evaluation of PSD increment consumption;
- an analysis of compliance with National Ambient Air Quality Standards (NAAQS);
- an evaluation of source-related impacts on growth, soils, vegetation, and visibility;
- and a Class I area impact evaluation.

Current EPA policy is to require an emissions analysis to include mobile sources. In this case, the change in mobile source emissions was negligible. The facility was an existing facility. Few, if any, new employees were added. The added equipment required a small amount of maintenance traffic. The vast majority of the feedstock for the plant arrived by pipeline rather than by vehicle. Existing mobile source emissions have been treated as background emissions.

A. Best Available Control Technology

A BACT analysis was required for all pollutants emitted above PSD-significance levels for each of the modifications. BACT is generally defined as "an emission limitation based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any...source...which on a case-by-case basis is determined to be achievable taking into account energy, environmental, and economic impacts and other costs." A "top-down" analysis is the preferred method for determining BACT. The five basic steps of the top-down procedure are:

- Step 1. Identify all control technologies
- Step 2. Eliminate technically infeasible options
- Step 3. Rank remaining control technologies by control effectiveness
- Step 4. Evaluate most effective controls and document results
- Step 5. Select BACT

The EPA has consistently interpreted statutory and regulatory BACT definitions as containing two core requirements that the agency believes must be met by any BACT determination, regardless of whether it is conducted in a "top-down" manner. First, the BACT analysis must include consideration of the most stringent available control technologies (i.e., those which provide the "maximum degree of emissions reduction"). Second, any decision to require a lesser degree of emissions reduction must be justified by an objective analysis of energy, environmental, and economic impacts.

The BACT analysis evaluates control technologies/techniques for the following pollutants emitted from the sources identified above:

- PM₁₀ from the FCCU catalyst receiving hopper,
- NO_x emissions from Crude Unit heaters 102A and 102B,
- VOC emissions from the Crude Unit fugitive area, and
- NO_x, CO, SO₂, and PM₁₀ emissions from the FCCU two-stage regenerator.

All proposed and applied BACT must meet, at minimum, all applicable NSPS and NESHAP. In some cases, technologies not sufficiently effective by themselves can be used in tandem to achieve BACT emission reduction levels.

The BACT analysis was originally submitted on December 28, 1998. It was later updated by a submittal on April 21, 2000, by Environmental Resources Management (ERM). This BACT analysis was accepted as submitted and was incorporated into Consent Order No. 02-007. The updated application was submitted on July 23, 2002. The BACT analysis in this permit memorandum was based on and contains information from the analysis provided by ERM. Based on the BACT analysis the table below summarizes the BACT selected for the sources previously identified.

Selected BACT

Source	PSD Trigger Pollutant	Selected BACT
FCCU Catalyst Receiving Hopper	PM ₁₀	Cyclone and Wet Scrubber
Crude Unit Heaters H-102A and H-102B	NO _x	Ultra Low-NO _x Burners
Crude Unit Fugitive Emissions	VOC	Leak Detection and Repair
FCCU No. 1 Regenerator & CO Boiler/Incinerator	NO _x	Low-NO _x Burners for the CO Boiler and Control of Feedstock Hydrotreatment
	CO	Thermal Oxidation
	SO ₂	Wet Gas Scrubber
	PM ₁₀	Wet Gas Scrubber
FCCU No. 2 Regenerator	NO _x	Control of Feedstock Hydrotreatment
	CO	High Temperature Regeneration
	SO ₂	Wet Gas Scrubber
	PM ₁₀	Wet Gas Scrubber

FCCU Catalyst Receiving Hopper**PM₁₀**

1) Identification of All Available Control Technologies

Listed below are all the available control technologies for control of PM₁₀. After that a brief description of each control technology is given.

- Porous Sintered Media
- Baghouse
- Wet Gas Scrubber (WGS)
- Electrostatic Precipitator (ESP)
- Ionizing Wet Scrubber®
- Cyclone

Porous Sintered Media

Porous sintered media filters consist of multiple, rigid, high temperature, continuous flow filter elements housed in an exterior vessel designed to provide tertiary solids separation in place of a third-stage cyclone. Captured particulate is periodically removed from the filter elements to a hopper by any of various automated blowback techniques such as jet-pulse cleaning. The maximum allowable temperature for the filter media is 1,150 °F. The field efficiency, which must be verified by field-testing, is approximately 99.97% by weight.

Baghouse

A baghouse uses fabric filtration to remove particles from a gas stream. An airstream flows through a number of filter bags in parallel, where particulate collects on the fabric. The fabric serves primarily as a medium for a layer of particulate to collect. It is this layer of particulate that collects small particles from the stream. The units are modular in design, allowing the addition of units to accommodate changes in operation, and the units require a relatively low-pressure drop.

Wet Gas Scrubber

WGSs are used to reduce particulates (including SO₃). Flue gas enters the scrubbers where intensive gas/liquid contacting removes particulates by inertial impaction and/or condensation of liquid droplets on particles in the gas stream.

Electrostatic Precipitator

Electrostatic precipitation of particles involves four steps:

1. Conditioning the air stream to make it amenable to the ESP;
2. Ionizing particles in the air stream;
3. Collecting the charged particles on collector plates; and
4. Removing the charged particles from the plates, usually by rapping.

ESPs are common for use on large utility and industrial boilers, and produce a high level of efficiency in practice (greater than 90% under optimal operating conditions). They also have the advantage of a high efficiency rate for small particles and are effective for wet or dry streams over a wide range of gas temperatures.

Ionizing Wet Scrubber®

Ceilcote Air Pollution Control manufactures what they call an Ionizing Wet Scrubber® (IWS) which collects submicron particles, liquid particles, and gases by a combination of electrostatic charge, attraction, impaction, and gas absorption. In the Ceilcote IWS, high voltage ionization is used to electrostatically charge the particulate in the gas stream before passing through a crossflow scrubber section equipped with Tellerette® packing that absorbs gases and collects solid and liquid particles. Small particles (< 3 micron) are removed by attraction to the neutral surfaces of the packing and the scrubbing droplets. Larger particles (> 3 micron) are collected by inertial impaction. Gases in the stream are removed by physical and/or chemical absorption to the packing and scrubbing droplets. Typically, the IWS technology is estimated to remove less than 90% of PM₁₀.

Cyclone

Cyclones are used extensively for particle collection in industrial applications. Cyclones work by forcing particle-contaminated gas into a downward spiral within the unit. Centrifugal force and inertia force the particles in the gas outward toward the outer wall. Upon contact with the outer wall, the particles slide down and out the bottom of the cyclone. Due to the shape of the cyclone, gas changes direction to move upward in a smaller inner spiral. The cleaned gas exits through the top of the device and the separated particles exit through the bottom of the device.

Cyclones are commonly used because they are inexpensive, and the lack of moving parts keeps the maintenance requirements lower than other pollution control devices. However, because cyclones are inefficient for removal of small particles, they are used primarily for large particle-size streams or to pre-clean streams prior to treatment by another pollution control device.

2) Eliminate Technically Infeasible Control Technologies

Porous Sintered Media

A porous sintered metal filter is not a feasible technology for control of PM₁₀ from the catalyst hopper. The 60% moisture content of the gas stream is too high for porous sintered media to operate properly. A leading vendor of metal filters, Pall Corporation, was contacted by the applicant, but declined to provide a quote for this application. Because a leading manufacturer and vendor of porous sintered metal filters indicated that this technology is not appropriate for the catalyst hopper, porous sintered media was considered to be technologically infeasible for this application.

Baghouse

A baghouse is not a feasible technology for the control of PM₁₀ from the catalyst-receiving hopper. The catalyst hopper is driven by a steam ejector, and typically has a moisture content of approximately 60% as a result. Two vendors of baghouses, Saunco Air Technologies and Air Cleaning Specialists, were contacted by the applicant to discuss the catalyst receiving hopper application. Both vendors declined to provide a quote and indicated that the moisture content would prevent the baghouse from achieving maximum removal efficiency. Because both vendors contacted by the applicant indicated that a baghouse is used primarily for dry processes and neither provided a quote for a baghouse for the catalyst receiving hopper, this technology was considered technically infeasible.

3) Rank Remaining Control Technologies

Feasible PM₁₀ Control Technologies

Control Technology	Estimated Control Efficiency
Wet Scrubber (WS)	>90%
Electrostatic Precipitator	>90%
Ionizing Wet Scrubber®	<90% (estimated)
Cyclone	50% *

* - Although cyclones may achieve much higher control efficiencies on streams with large particle sizes, the particulate emissions for the hopper consist mainly of small-size (<10 um) particles. A cyclone is not expected to provide high efficiency particulate removal for this application.

4) Evaluate Remaining Control Technologies and Document Results

Wet Scrubber

The proposed BACT for PM₁₀ control from the catalyst feed hopper is a WS. A single WS will be used to control emissions from the FCCU No. 1 and No. 2 Regenerators and the Catalyst Receiving Hopper. The FCCU Catalyst Receiving Hopper is an intermittent source of PM. Emissions are small and only result during loading of FCCU catalyst into the fresh make-up catalyst hopper. Therefore, this unit can be controlled by venting it to the proposed control devices for the regenerators. Since this unit will be controlled by the proposed control device for the regenerators, all other control devices must be considered in addition to the WS and not as a PM₁₀ control technology by itself.

Electrostatic Precipitator & Ionizing Wet Scrubber®

As redundant control devices with similar control efficiencies as the WS, these control options are not considered further.

Cyclone

The FCCU Catalyst Receiving Hopper is currently controlled using a cyclone. The proposed controls for this unit include the cyclone in addition to the WS.

5) Select BACT

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
PM ₁₀	Wet Scrubber and Cyclone	1.88 Tons/Year	Monitor 24-hour average WS liquid flow rate and pressure drop as parametric indicator of desired control efficiency. Indicator ranges to be determined based on future performance tests on actual installed control equipment.

The controls and emission limits proposed for the FCCU Catalyst Receiving Hopper are consistent with recent BACT determinations in the RACT/BACT/LAER Clearinghouse (RBLC).

Crude Unit Heaters H-102A and H-102B**NO_x**

1) Identification of All Available Control Technologies

Listed below are all the available control technologies for control of NO_x. After that a brief description of each control technology is given.

- Selective Catalytic Reduction (SCR)
- SCONO_xTM
- Ultra Low-NO_x Burners (ULNB)
- Selective Non-Catalytic Reduction (SNCR)
- Low-NO_x Burners (LNB)
- Flue Gas Recirculation (FGR)
- Low Excess Air (LEA)
- Steam Injection
- Reburning
- Staged Combustion

Selective Catalytic Reduction

EPA documentation states that, where applicable, SCR offers the highest percent reduction of the available NO_x reduction techniques. The SCR process is a post-combustion NO_x control technique which involves the mixing of anhydrous or aqueous ammonia (NH₃) vapor with flue gas (NO_x) and passing the mixture through a catalyst bed at temperatures between 600 and 800 °F to reduce NO_x to form molecular nitrogen (N₂) and water.

The most important factor affecting SCR efficiency is temperature. SCR can operate in a flue gas temperature window ranging from 500 to 1,100 °F according to EPA literature, although the optimum range for SCR is 625 to 700 °F. Temperatures below the optimum decrease catalyst activity and allow NH₃ to slip through. Temperatures above the optimum range oxidize NH₃ to form additional NO_x. SCR is also largely dependant on the stoichiometric ratio of NH₃ to NO_x. Variation of the ratio can reduce the removal efficiency of NO_x.

SCONO_xTM

Removal of NO_x using the SCONO_xTM system entails the catalytic oxidation of CO to CO₂ and NO to NO₂. The NO_x, which is reacted mainly to NO₂, is chemically reacted/adsorbed on the catalyst. NO_x is released from the catalyst as N₂. As of January 26, 2000, the SCONO_xTM system was in full-scale use in two locations. Both systems are used to control emissions from natural gas powered turbines with NO_x concentrations on the order of 25-30 ppm.

Ultra Low-NO_x Burners

ULNBs are designed to reduce the average oxygen concentration within the flame by recirculating hot, oxygen depleted, flue gas from the flame or firebox back into the combustion zone. This design maintains a flame temperature necessary for optimal combustion while

reducing oxygen concentrations, and subsequently, fuel NO_x formation. ULNBs are reported to typically achieve lower emission rates than LNB. The EPA document, "Alternative Control Technologies Document for NO_x Emissions from Process Heaters," states that ULNBs may achieve a reduction of approximately 75% for thermal NO_x and 78% for natural draft fuel NO_x.

Selective Non-Catalytic Reduction

With SNCR, NO_x is selectively removed by the injection of NH₃ or urea (CO(NH₂)₂) into the flue gas at an appropriate temperature window of 1,700 to 1,900 °F and without employing a catalyst. Similar to SCR (with the exception of the catalyst bed), the injected chemicals selectively reduce the NO_x to N₂ and water. This approach avoids the problem related to catalyst fouling but the temperature window is critical for conducting the necessary chemical reaction. At the proper temperature, urea decomposes to produce the NH₃ that is responsible for NO_x reduction. At a higher temperature, the rate of a competing reaction, direct oxidation of NH₃ to form NO_x, becomes significant. This pollution control technology typically provides a control efficiency of approximately 40%. In SNCR, NH₃ is injected into the heater prior to convective heat recovery, where the temperature ranges from 1,600 to 2,000 °F. The effectiveness of SNCR similar to SCR is largely dependant on the temperature of the injection zone. A control efficiency of 70% can be achieved using SNCR while an efficiency of 35 to 60% is usually seen.

Low-NO_x Burners

One approach to reduce NO_x emissions is to utilize LNB. The ease or difficulty in replacing existing burners with LNB depends on a number of factors including space constraints and the extent to which air and/or electrical service may need to be modified.

LNB employ the same principle as two-staged combustion. Primary combustion takes place at a lower temperature under oxygen-deficient conditions, then combustion is completed at a higher temperature with excess air. The process takes place within the burner itself. LNB are designed to optimize the oxygen-fuel mixture within the burner. Like FGR and steam injection, LNB reduce the temperature of the flame to reduce the formation of thermal NO_x by up to 30% to 50%. LNB are ineffective on fuel NO_x formation.

Flue Gas Recirculation

FGR involves the return of 15% to 30% of the flue gas to the burners and the introduction of the gas mixture into the combustion zone. FGR reduces the peak flame temperature and the local oxygen concentrations. FGR effectively inhibits thermal NO_x formation, but has only a limited effect on fuel NO_x formation. FGR is generally incorporated into the design of new boilers rather than retrofitted onto existing boilers.

Low Excess Air

LEA operation is a combustion technique that optimizes the amount of air available and reduces the formation of thermal and fuel NO_x. Excess air can only be reduced to the point of some constraint, such as CO formation, flame length, or flame stability, and the level to which excess air must be reduced varies with the type of source. LEA is not generally considered an effective technology for refinery gas-fired sources, because variations in gas composition make maintaining stack O₂ levels difficult. LEA also has the disadvantages of increasing CO

formation, and of offering little, if any reduction of NO_x emissions under many operating conditions. Under optimal conditions, NO_x emissions may be reduced by 1% to 15%.

Steam Injection

Steam or water injection is used to reduce the flame temperature, thereby reducing the formation of thermal NO_x. Water/steam injection is not effective in reducing fuel NO_x formation. Another version of this technique is to inject a water-in-oil emulsion, which operates on a similar principle as water/steam injection to reduce NO_x. This technique introduces water into the combustion process by emulsifying water in the fuel oil prior to its injection. The water emulsified in fuel oil reduces the flame temperature in the combustion zone thereby reducing thermal NO_x. However, water-in-oil emulsion is not effective in reducing fuel NO_x. For sources for which steam injection is appropriate, NO_x emissions may be reduced by up to 40% to 70%.

Reburning

The process of reburning requires about 15% to 20% of the fuel and air from a burner to be injected as separate streams downstream of the main flame. By injecting the fuel first, a rich combustion zone is created; the combustion air is injected later, returning the mixture to a fuel-lean environment. This scenario drives the destruction of NO in the combustion zone by favoring the reaction to molecular nitrogen. The effectiveness of reburning as a NO_x control strategy depends on several factors including stoichiometry and temperature in the fuel-rich region. This technology has been used for NO_x control on coal-fired boilers. Under appropriate operating conditions, NO_x reductions of up to 50% to 60% may be achieved.

Staged Combustion

Staged combustion is a combustion control technology that aims to minimize conversion of fuel bound nitrogen to NO_x compounds. Typically, a portion of combustion air is diverted from the main burner and injected into the downstream portion of the flame. The fuel-rich region created in the flame causes fuel nitrogen to convert preferentially to N₂ rather than to NO_x. Under ideal conditions, staged air has been demonstrated to achieve from 12% to 71% NO_x reduction in process heaters. However, advances in LNB technology have allowed the incorporation of staged combustion into burner design, making this technology redundant to LNB or ULNB technologies. Staged combustion outside the context of LNB can be more technically challenging because it creates serious variations in heat flux and temperature, and requires frequent replacement due to corrosion of required piping in process heaters

2) Eliminate Technically Infeasible Control Technologies

SCONOXTM

The SCONOXTM system is unproven as a control technology for a crude unit heater. To date, the system has been used to control emissions from natural gas powered turbines and internal combustion engines but it has not been used to control emissions from crude unit heaters. Also, due to the greater amount of PM₁₀ emissions from the heaters fouling of the catalyst could result. The manufacturer does not represent this technology to be applicable to other uses other than turbines. Recently, the manufacturer of the SCONOXTM system announced that it no longer

offers this control technology. Therefore, this technology is no longer available and will not be discussed further as a control technology for control of NO_x emissions.

Steam Injection

Steam injection is not an applicable technology for the crude unit heaters. Steam injection is used primarily in reducing NO_x from gas turbines, reciprocating engines and other internal combustion engines. The use of steam injection directly reduces the thermal efficiency of heaters, and is not used for this type of application as a result.

Reburning

Reburning is not considered technically feasible for the crude unit heaters. Reburning is used for control of NO_x in boilers, particularly coal-fired boilers. The Alternative Control Technology for Process Heaters document makes no mention of this technology and reburning was not found in the RBLC for this type of application. Therefore, reburning is not considered a demonstrated control technology.

Staged Combustion

Staged combustion is incorporated into ULNB and is not addressed further.

3) Rank Remaining Control Technologies

Potential NO_x Control Technologies

Control Technology	Estimated Control Efficiency
Selective Catalytic Reduction	>90%
Ultra Low-NO _x Burners (102A)	76% to 84% *
Ultra Low-NO _x Burners (102B)	68% to 79% *
Selective Non-Catalytic Reduction	25% to 70% **
Low-NO _x Burners	30% to 50%
Flue Gas Recirculation	15% to 30% ***
Low Excess Air	1% to 15%

* - Based on stack testing.

** - Although the literature cites control efficiencies ranging from 25% to 70%, much lower efficiencies would be expected on the crude unit heaters because the initial NO_x concentrations are below the threshold at which SNCR is effective.

*** - Staged combustion is incorporated into the design of ULNB and is considered a redundant control technology.

4) Evaluate Remaining Control Technologies and Document Results

Selective Catalytic Reduction

Emissions of NH₃ or additional NO_x emissions are environmentally unsatisfactory situations especially if other pollution prevention technologies, such as ULNB, can be shown to offer comparable results. NH₃ odors will result from the process since NH₃ metering/monitoring is not yet sophisticated enough to control injection precisely, and the reaction is never 100% complete. Both stack and fugitive NH₃ odors would be perceptible in the areas surrounding the

facility. In addition to NH₃ odors, a visible plume of fine ammonium sulfite/sulfate PM may result from this process. NH₃ storage can also be hazardous. NH₃ emissions could potentially be as high as 20 ppmv. Disposal of catalytic waste created from the SCR system will create an additional economic and environmental burden. The spent catalyst from the system must be replaced and disposed of at certain intervals. The SCR catalyst typically contains titanium or vanadium pentoxide. Vanadium pentoxide is considered a hazardous waste.

Ultra Low-NO_x Burners

As part of the compliance demonstration efforts made for the operating permit application, TPI installed ULNB in the heaters. The heaters were then stack tested after the installation of the burners. According to the stack tests, the existing ULNB on heater H-102A reduced the total annual emissions from a baseline of 118.3 TPY to approximately 31.54 TPY, a 73% reduction. An ULNB currently controls NO_x emissions from Crude Unit Heater H-102B. The existing ULNB on Heater H-102B reduces total annual NO_x emissions from a baseline emission rate of 110.1 TPY to approximately 34.9 TPY, a 68% reduction. Only an SCR system (90% efficient under optimum conditions) has higher control efficiency than the ULNB for heaters H-102A and H-102B. Since there are no solid or liquid waste streams associated with ULNB and this technology is currently employed at this facility, there are no additional energy, environmental, or economical impacts to be considered.

Selective Non-Catalytic Reduction

A control study performed at the Valero Ardmore Refinery indicated that the highest control efficiency that could be expected for the heaters using SNCR for the refinery-specific conditions would be only 30%.

Low-NO_x Burners

Since ULNB are currently used to control emissions of NO_x from the crude unit heaters, LNB are considered redundant and are not discussed further.

Flue Gas Recirculation

FGR has been used on few direct-fired heaters because it has several drawbacks. One of these drawbacks is that FGR can only be used on forced draft heaters because of the need to recirculate the flue gas. Since the Crude Unit heaters are both natural draft heaters, FGR is considered technically infeasible.

Low Excess Air

Due to the low control efficiencies of low excess air, it is not considered further.

Control Technology Combinations

Combinations of control technologies for these two units are not economically justified. While the cost of the controls remains the same, the decrease in emissions is very small. Therefore, the incremental cost of reducing the emissions with combined controls is exorbitant.

ULNBs that were installed on the crude unit heaters in 1998 are not considered in the baseline emissions calculated for the crude unit heaters since they were installed with the primary purpose of meeting BACT requirements. SCR was evaluated as a possible control alternative to ULNB

but the calculated cost was significantly higher than the ULNB and was determined to not be economically justifiable. The economic impacts of the installation of a SCR system would be considerable. The retrofit of a SCR system on an existing combustion source can be costly and complex. The table below shows the heater, the control devices, the TPY reduction and the average cost effectiveness of the control device(s).

Heater	Control	Reduction (TPY)	Average Cost Effectiveness (\$/ton)
H-102A	SCR (90%)	106.5	\$12,694
	ULNB	89.7	\$1,844
	SCR & ULNB	115.4	\$13,048
H-102B	SCR (90%)	99.1	\$9,079
	SCR (80%)	88.1	\$8,178
	ULNB	75.2	\$1,975
	SCR & ULNB	106.6	\$9,629

An SCR of 80% removal efficiency was also investigated to determine if the lower cost unit would be cost effective. The cost savings realized by using a less efficient SCR system was not significant enough to make SCR an economically justifiable NO_x control option. Both the annualized cost and the incremental cost of the SCR system are well out of the range of BACT NO_x control costs for similar sources during the time frame that the BACT was submitted. In addition, ULNB is a proven technology on the heaters at the Ardmore Refinery.

5) Select BACT

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Unit	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
NO _x	102A	Ultra Low NO _x Burners	0.045 lb/MMBTU and 31.54 tons/year	Operate burners according to manufacturer specifications. Use emission factor reported by performance test and monthly fuel usage to calculate rolling 12-month total.
NO _x	102B	Ultra Low NO _x Burners	0.059 lb/MMBTU and 34.9 tons/year	

The emission limits are based on testing. Recent testing has confirmed that the heaters can meet these limits. The controls and emission limits proposed for the crude unit heaters are consistent with the BACT determinations issued during 2000 and 2001 in the RACT/BACT/LAER Clearinghouse.

Crude Unit Fugitive Emissions**VOCs**

The most effective method for controlling fugitive emissions is periodic monitoring to locate leaking components followed by the prompt repair of any leaking equipment. Thus, the industry accepted standard BACT for VOC emissions from fugitives is a Leak Detection and Repair (LDAR) program. A LDAR program is currently implemented for the Crude Unit fugitive area. The existing LDAR program in the area of the Crude Unit is considered BACT for VOCs and is also considered the Maximum Achievable Control Technology (MACT). A full "top-down" BACT analysis for fugitive VOCs from the Crude Unit area is not performed because the currently implemented LDAR program meets the current industry fugitive VOC BACT standards. The crude unit area is also subject NSPS, Subpart GGG.

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Leak Detection Thresholds	Proposed Monitoring
VOC	Leak Detection and Repair (OVA & Method 21)	500 or 10,000 ppm leak detection limits per NSPS Subpart GGG	Per NSPS Subpart GGG Frequencies

FCCU Regenerators

The FCCU consists of the riser, the reactor, a two stage regenerator system, air blowers, spent catalyst stripper, catalyst recovery equipment, and regenerator equipment for controlling air pollutant emissions and for heat recovery. The FCCU regenerator at the TPI Ardmore refinery operates in two stages. The first regenerator stage operates in an oxygen deficient, partial burn mode. The second stage regenerator is a full-burn, or high temperature regeneration, operation.

The FCCU regenerator at the Ardmore refinery is subject to NSPS, Subpart J. The applicable NSPS maximum allowable emissions from a FCCU regenerator are listed below:

NSPS Limits For FCCU Regenerators

Pollutant	Emission Limit	Reference
PM ₁₀	1.0 lb/1,000 lb coke burn-off	40 CFR 60.102(a)(1)
CO	500 ppm _{dv}	40 CER 60.103(a)
SO ₂	90% reduction or 50 ppm _v	40 CER 60.104(b)(1)
	9.8 kg/1,000 kg coke burn-off	40 CFR 60.104(b)(2)
	0.3 wt % S in FCCU feedstock	40 CFR 60.104(b)(3)

Currently there are no NSPS or NESHAP regulations applicable to emissions of NO_x or VOC from the FCCU regenerators. There are currently three choices of control standards to meet the SO₂ NSPS requirements for the FCCU regenerators. The refinery is currently meeting the 0.3 wt % S in FCCU feedstock standard.

The resources consulted in the compilation of potential options for CO, NO_x, SO₂ and PM₁₀ control for the Ardmore refinery FCCU include the following:

- EPA's New Source Review Website
- The Maximum Achievable Control Technology (MACT) floor analysis included in the preamble to the proposed Part 63 Subpart UUU - NESHAP from Petroleum Refineries – Catalytic Cracking (Fluid and Other) Units, Catalytic Reforming Units and Sulfur Plants
- U.S. EPA's RBLC database
- Texas Natural Resource Conservation Commission (TNRCC) FCCU BACT guidance
- South Coast Air Quality Management District (SCAQMD) FCCU BACT guidelines
- Control technology vendors
- Technical books and articles
- Other refineries with similar process limits

Additionally, the environmental agencies for Illinois, Indiana, Ohio, Michigan, Wisconsin, Arkansas, Oklahoma, New Mexico, and Louisiana were surveyed for guidance on BACT for FCCUs. All of these agencies indicated that they rely on the RBLC database as a basis for review of proposed BACT and that all determinations are made on a case-by-case basis. None of these states have any definitive BACT requirements or guidance for FCCUs.

FCCU No. 1 Regenerator and Thermal Oxidation System

NO_x

1) Identification of All Available Control Technologies

Listed below are all the available control technologies for control of NO_x from the FCCU No. 1 Regenerator system. A brief description of the control technology that has not already been described is given.

- Selective Catalytic Reduction (SCR)
- Ultra Low-NO_x Burners (ULNB)
- Selective Non-Catalytic Reduction (SNCR)
- Hydrotreatment
- Low-NO_x Burners (LNB)
- Flue Gas Recirculation (FGR)
- Low Excess Air (LEA)
- Steam Injection
- Reburning

Hydrotreatment

A hydrotreater entails the use of hydrogen gas with a catalyst to remove feed impurities. Hydrotreating is generally used to remove nitrogen- and sulfur-containing materials from feedstocks by selectively reacting these materials with hydrogen in a catalyst bed at high temperature. Hydrotreating reduces the formation of fuel nitrogen by reducing the overall nitrogen content of the feedstock, and efficiencies vary depending on the nitrogen content of the feedstock. Removing nitrogen from the feedstock is intended to eliminate NO_x emissions from nitrogen in fuel (fuel NO_x). It does not prevent oxidation of atmospheric nitrogen in combustion processes. The potential removal efficiency of a Hydrotreatment unit is estimated to be 50% to 85%.

2) Eliminate Technically Infeasible Control Technologies

SCR

SCR is considered a technically infeasible option for NO_x control due to the significant potential for catalyst fouling due to FCCU reversals. At the time of submittal, the RBLC bulletin board contained no entries of SCR being successfully used for control of NO_x from FCCU regenerators, despite the fact that several of the RBLC entries did employ either an ESP or a WS for particulate control, which could theoretically protect the SCR from catalyst reversals. Information from equipment vendors and with South Coast Air Quality Management District (SCAQMD) also supports the fact that SCR is not an applicable control technology for FCCU emission streams. It should be noted, that the Exxon-Mobil Refinery in Torrance, California was issued a permit to install an SCR system on their FCCU by SCAQMD. However, the proposed SCR system has not yet begun operation and based on information from SCAQMD personnel, there will be no NO_x emission limits for the FCCU/SCR system. Instead, the Refinery will meet a facility wide NO_x limit. In addition, technical details of the FCCU design and operation are confidential according to both SCAQMD and Mobil-Exxon and are not available for purposes of this BACT analysis. Thus, no conclusions may be drawn regarding the similarity of Mobil-Exxon's FCCU system and the Ardmere Refinery's FCCU system. Furthermore, use of SCR at the Mobil-Exxon Refinery does not, on its own, indicate that SCR is applicable to the Ardmere Refinery's FCCU system. Based on the foregoing, SCR is not considered a feasible control technology for the Ardmere Refinery.

Steam Injection

Steam injection is considered a technically infeasible option for control of NO_x from the FCCU No. 1 Regenerator for two primary reasons. The first is that the increased moisture resulting from the steam is likely to result in equipment corrosion and affect CO Boiler destruction efficiency. The second is that steam injection has primarily been applied to date for control of NO_x from gas turbines. Steam injection is an appropriate technology for gas streams containing only trace levels of particulate. There are no entries identified in the RBLC bulletin board of the application of this technology being applied for the control of NO_x from FCCU regenerators. Communications with equipment vendors by the applicant also resulted in no identified cases of this technology ever being applied in practice to FCCU regenerators. Additionally, based on an independent study, even if this technology could be used on the FCCU No. 1 Regenerator system, its NO_x removal efficiency would be negligible.

Reburning

Because of the basic design of the regenerator, reburning is not considered a viable control technology for the regenerator itself. The effectiveness of reburning as a NO_x control strategy is dependant on mainly injection and mixing of secondary fuel into the combustion products coming from the main combustion zone and the thermal environment in the fuel-rich, secondary combustion zone. It is necessary to reduce the air in the fuel rich zone to approximately 90% excess air and for the temperature in the fuel rich zone to be approximately 2400 °F or higher. If the temperature is below this level, reduction of NO to N₂ will not occur. Because of heat extraction through the boiler walls, little if any thermal NO is formed by the second and third stage of combustion created by reburning. For the CO Boiler and Incinerator, it is possible to create the fuel rich environment but there is no way to create the approximate thermal environment. Therefore, reburning is not considered an effective control technique for the CO Boiler or Incinerator.

3) Rank Remaining Control Technologies

Potential NO_x Control Technologies

Control Technology	Estimated Control Efficiency
Hydrotreatment of Feedstock	50%
ULNB*	30% to 50%*
LNB*	30% to 50%*
SNCR	<30%
Low Excess Air	1% to 15%
Flue Gas Recirculation	Negligible**
Staged Combustion	Negligible**

* - LNB for the CO boiler are custom modified and incorporate beneficial aspects of ULNB design. LNB are equivalent to the ULNB and are not evaluated separately.

** - Under certain operating conditions these controls can increase the potential to emit of NO_x or CO.

4) Evaluate Remaining Control Technologies and Document Results

The most effective NO_x control technologies among the feasible options are LNB and the SNCR process. Because of the relative complexity of the Ardmore Refinery's FCCU system, there are a number of possible locations, or combinations of locations in which these pollution control devices might be installed. The NO_x reduction potential and cost effectiveness of SNCR and LNB are evaluated for several feasible locations in this section of the BACT analysis report. Although for some applications ULNB may achieve greater levels of NO_x reduction than LNB, the NO_x control technology study conducted at Ardmore Refinery indicates that this would not be true for the Refinery's CO Boiler. The CO Boiler would require modified LNB due to physical and operational boiler constraints. The NO_x technology study assessed a burner design that incorporates the NO_x reducing features of commercially available LNB and ULNB that would be applicable to the CO Boiler. Therefore, LNB and ULNB are considered equivalent

technologies in this case, and the ULNB are not evaluated as a separate technology for this type of application.

Hydrotreatment of Feedstock

Hydrotreatment is already being used to treat the feedstock for the FCCU system. This reduces the amount of nitrogen containing materials in the coke and the emissions of NO_x and other nitrogen compounds from combustion of the coke in the regenerator and the regenerator off-gases in the CO Boiler/Incinerator. This is considered the baseline control technology for the FCCU No. 1 Regenerator. All other control technologies were reviewed in addition to this control technology.

ULNB and LNB

LNB are not options for the regenerator itself since it does not have burners or combust fuel using burners. The regenerator basically supplies oxygen to the catalyst to combust the deposits of coke on the catalyst. LNB are a hypothetically feasible technology for the CO Boiler and the Incinerator since they utilize burners to fire fuel in these units. LNB could theoretically replace the existing burners on the CO Boiler, the Incinerator, or on both units. However, the configuration of the Incinerator prevents the LNB burner technology from being used on this unit. According to the NO_x study, there is no commercially available burner that could be applied to the Incinerator, and no practical and economical way to modify the design of a LNB to make it effective for use in the Ardmore Refinery's Incinerator. As a result, the LNB technology is not considered technically feasible or commercially available for the Incinerator.

The existing burners on the CO Boiler could feasibly be replaced with a low NO_x design. Although the configuration of the boiler might require modifications to be made to existing LNB designs this technology could be used successfully on the CO boiler, with a control efficiency of between 30% to 50%. The cost per ton of NO_x removed by a LNB is estimated to be \$1,357 annually.

SNCR

A detailed NO_x assessment was completed by General Electric – Energy and Environmental Research Corporation (GE EER), the assessment indicated that SNCR is a feasible control technology for the CO boiler. As stated in the NO_x Control Technology Report, if SNCR were installed in the CO boiler, the technology would be likely to have serious, negative environmental impacts. The peak flame temperature in the CO boiler is not estimated to be high enough to maintain the temperature and residence time required for optimum SNCR performance. Consequently, significant NH₃ slip would be expected; if urea rather than NH₃ were utilized for the SNCR reagent, nitrous oxide (N₂O), a greenhouse gas, will be emitted. Another implication of operating an SNCR system at low temperatures is that the SNCR reaction can consume radical species necessary for the oxidation of CO to CO₂. As a result, emissions of CO from the CO Boiler would increase. In theory, the temperature of the CO boiler could be increased to reduce these environmental impacts. However, increasing the temperature of the CO boiler would cause uncollected catalyst material to form slag deposits on convective sections of the boiler and effectively reduce the ability of the boiler to perform its primary function of producing steam. Increasing the temperature of the boiler would also require a decrease in the FCCU off-gas flow through the boiler so more flow would have to be diverted to the incinerator.

Since there are no identified feasible NO_x controls for the incinerator beyond the existing hydrotreatment, diverting more flow through the incinerator would increase the NO_x emissions from the FCCU No. 1 Regenerator system.

In addition to these potential environmental impacts, an SNCR system installed in the CO Boiler would be expected to provide an overall control efficiency from the FCCU (including emissions from both the FCCU No. 1 and No. 2 Regenerators) of only approximately 15%. Installation of SNCR in the CO Boiler would not treat emissions from the FCCU No. 2 Regenerator, and would treat only 70% of the flow from the FCCU No. 1 Regenerator estimated to go to the CO boiler during full-load conditions. As a result, the cost effectiveness of this option would be approximately \$4,984 per ton of NO_x. Therefore, in addition to the environmental impacts likely to result from operation of SNCR, the cost effectiveness of this option exceeded the typical costs incurred by other similar sources during the time frame that the BACT was submitted.

The other possible scenario for use of SNCR on the FCCU No. 1 Regenerator is to combine the streams from the CO Boiler and the Incinerator in such a way that the one-second retention time and 1,700 to 1,900 °F operating temperature required for efficient SNCR use are achieved. The most efficient way to achieve these conditions appears to be replacing the existing CO boiler with a larger CO boiler meeting the SNCR operating requirements. This option would cost approximately \$9,964/ton NO_x. Since the cost effectiveness of this option exceeds the costs incurred by other sources, this option was also eliminated based on energy and economic considerations.

Low Excess Air (LEA)

Since the FCCU No. 1 Regenerator is a partial burn regeneration unit and it basically uses air injection into the regenerator to combust the coke from the catalyst, the regenerator operates in a LEA environment. The amount of air into the regenerator is carefully controlled to keep the regenerator operating in an oxygen deficient/partial burn mode. Based on stack tests, the FCCU No. 1 Regenerator, CO Boiler, and Incinerator operate with low excess air. An increased reduction of excess air is expected to increase CO emissions dramatically.

Flue Gas Recirculation

FGR reduces the peak flame temperature and the local oxygen concentrations. FGR effectively inhibits thermal NO_x formation, but has only a limited effect on fuel NO_x formation. The FCCU regenerator already is operated in an oxygen deficient, partial burn mode. The majority of the NO_x from the regenerator is produced from fuel NO_x. For the CO Boiler, the regenerator off-gas acts much the same as recirculated flue gas. The peak flame temperature is already so low that thermal NO_x formation is expected to be negligible. Also, further suppression of the flame temperature would decrease the CO oxidation rate in the CO Boiler and would result in an increase in CO emissions. The incinerator operates in much the same way as the CO Boiler and would have the same concerns as the CO Boiler. Based on the reasons stated above FGR is not expected to significantly reduce formation of NO_x in the FCCU No. 1 Regenerator system and is not considered further.

Staged Combustion

Because of the basic design of the regenerator, staged combustion is not considered a viable control technology. The primary source of fuel nitrogen for the CO Boiler and the Incinerator is the regenerator off-gases. In the current configuration of the CO Boiler and Incinerator, regenerator off-gas is rapidly mixed with the available combustion air at approximately the same location as the fuel-gas flame front. Even if a significant portion of the combustion air was diverted downstream of the flame, the regenerator off-gas would be rapidly mixed with an excess quantity of oxidizer and would not result in a significant decrease in NO_x emissions.

Control Technology Combinations

Combinations of technologies must be examined for two primary reasons. First, the combination may provide increased removal efficiency of a pollutant. Second, the upstream control device in a combination may change a stream characteristic that would otherwise render the downstream control device infeasible. For example, an SCR is unable to handle high particulate loads, such as those that would be encountered when large quantities of catalyst were dumped during an upset. It is theoretically possible, that a particulate control device upstream of an SCR could allow the successful use of an SCR for this application.

In addition to the reasons for technical infeasibility presented earlier in this section, the reviewed combined control technologies would also have significant associated energy costs. For each of the combinations below, the cooler (and possibly saturated) gas leaving the upstream control device would have to be reheated to the high temperatures required for CO combustion (~1,800 °F). The additional heating required is not compatible with the successful operation of the existing CO Boiler/Incinerator. The FCCU regenerator off-gas is typically 1,100 °F, and thus already requires some additional heating within the CO Boiler or Incinerator. In addition, one must remove the SO₃ prior to removing particulates because as the air stream cools, sulfuric acid (H₂SO₄) will form and quickly cause detrimental damage to downstream equipment.

The review was limited to combinations that are known to be in use for a similar application, that are not redundant, and systems that would not be cost prohibitive. Control technologies reviewed in addition to the selected BACT (Hydrotreatment/LNB) to increase removal efficiencies of NO_x are SNCR, FGR, and LEA.

In theory, it is possible to use a combination of SNCR and LNB to control NO_x in the CO Boiler. According to a SNCR vendor, however, the maximum control that may be achieved by SNCR will reduce emissions to no lower than 20 ppm. Because the emissions in the CO Boiler have been measured at relatively low concentrations in the range of 55 to 60 ppm, and a LNB is expected to achieve approximately 50% reduction in NO_x levels, very little additional NO_x removal would be expected by adding an SNCR System. An SNCR System operating at its full capacity (a reduction to 20 ppm) would cost an additional \$13,212/ton of NO_x removed annually when combined with LNBs. Based on this high cost of removing the small quantity of additional NO_x, and on the environmental impacts discussed earlier, the combination of LNB and SNCR for the CO Boiler is neither economically nor environmentally justified.

Low excess air (LEA) combustion would not appreciably reduce NO_x emissions in combination with the proposed BACT because LEA is not considered an effective control for a unit fired with refinery fuel gas. Flue gas recirculation is not considered economically or technically feasible due to the minimal decrease in NO_x emissions and the increased CO emissions.

Combination of FCCU Regenerator Streams

Selective Catalytic Reduction

Combining the two FCCU regenerator streams will not eliminate any of the factors limiting the successful use of SCR at the Ardmore Refinery. SCR is not a feasible option for the combined FCCU regenerator streams.

Ultra Low-NO_x and Low-NO_x Burners

As with the FCCU No. 2 Regenerator, neither ULNB nor LNB are applicable to the combined regenerators' stream. The combined regenerators' stream does not employ burners, and because ULNB and LNB are only effective at reducing NO_x produced by the combustion of fuel by burners, neither ULNB nor LNB are considered a feasible control technology for a combined regenerator stream.

Hydrotreatment

Hydrotreatment is a technology used for removing nitrogen- and sulfur-containing materials from refinery feedstocks. Hydrotreatment is already being used to treat the feedstock for the FCCU system feedstock. Since there would be no additional feed associated with combining the off-gases from the FCCU No. 1 and 2 Regenerators, additional hydrotreatment would not be an applicable technology under this scenario.

Flue Gas Recirculation

FGR would not be applicable to a combined regenerators' stream. FGR reduces the formation of thermal NO_x which would not be expected to occur in the FCCU regenerators combined stack. Therefore, FGR is not considered a feasible control device for this scenario.

Steam Injection

Steam injection would not be applicable to a combined stream. Steam injection must be used to lower a flame temperature to reduce the formation of thermal NO_x. Since there is no flame in the stack, and NO_x is formed only in the individual regenerators, steam injection is not applicable to the combined stream.

Reburning

As with FGR and steam injection, reburning would not be applicable to the combined stream. Reburning is used to reduce NO_x formation in the combustion zone. Since there is no flame in the stack, and NO_x is formed only in the individual regenerators, reburning is not applicable to the combined stream.

Staged Combustion

Staged combustion is a combustion-control technology used to reduce the formation of NO_x from the combustion zone. Since there is no flame in the stack no NO_x formation is expected to occur in the stack, staged combustion is not an applicable control technology for the combined regenerators' stream.

5) Select BACT

LNB are proposed as BACT for the FCCU system. The LNB installed in the CO Boiler are expected to achieve an overall NO_x reduction of approximately 26%. The reduction in the CO boiler alone is expected to be between 30% to 50%.

LNB also do not have the potential for NH₃ or N₂O slip that SNCR does, and neither NO_x nor CO emissions are likely to be increased by the use of a LNB. SNCR if operated outside the optimum temperature range has this potential. Another environmental benefit of LNBs is that additional chemicals are not required for its use, in comparison to SNCR, which requires the storage and use of urea or NH₃. Based on the expected efficiency of LNB for NO_x control from the FCCU No. 1 Regenerator CO Boiler and on the environmental benefits in comparison to SNCR, LNB technology is proposed as BACT.

The NO_x concentration in the FCCU stack gas will be monitored using CEMS. Monthly-average values for stack gas NO_x and H₂O content, and stack gas flow rate will be used to calculate 12-month rolling total NO_x emissions for comparison to the proposed NO_x emission limit.

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
NO _x	Feed Stock Hydrotreatment & Low-NO _x burners in the CO boiler.	216.0* tons/year	NO _x continuous emissions monitoring systems (CEMS). Compute 12-month rolling total NO _x emissions using monthly average NO _x concentration monitored along with monthly average H ₂ O concentration, and monthly average stack gas flow rate.

* - All NO_x emissions from the FCCU No. 1 Regeneration Unit are combined with the FCCU No. 2 Regeneration Unit. This number only represents the portion of NO_x contributed by the FCCU No. 1 Regenerator system.

CO

Carbon monoxide generation in the FCCU regenerator occurs from the incomplete thermal oxidation of carbon on the spent catalyst. Because the oxidation of CO to carbon dioxide (CO₂) generates significantly more heat than that of carbon (C) to CO, refiners typically operate regenerators under partial burn to maintain temperatures of the FCCU within the design specifications. TPI's FCCU No. 1 Regenerator is operated in partial burn to effect better control for FCCU temperatures than is practical from controlling fuel and oxygen feeds. The NSPS limit for CO is 500 ppmvd. Listed below are all the available control technologies for control of CO from the FCCU No. 1 Regenerator. A brief description of the control technologies is also given. The refinery currently uses a combination of a CO Boiler and a CO Incinerator as baseline controls on the FCCU No. 1 Regenerator. The boiler and incinerator are operated in parallel to one another and share a common stack. The 1998 stack test data indicates an average flue gas CO concentration of 308 ppmvd. This scenario is proposed as BACT for the FCCU No. 1 Regenerator.

1) Identification of All Available Control Technologies

- Catalytic Oxidation
- Thermal Oxidation
- High-Temperature Regeneration
- Combustion Promoter

Catalytic Oxidation

In catalytic oxidation, a catalyst enables the oxidation reaction to occur at much lower temperatures and at shorter residence times than in thermal oxidation. These conditions reduce operating costs, enable a smaller-sized system than thermal oxidation (incineration), and reduce construction material requirements. The most efficient catalysts are precious metals dispersed on high surface area washcoats that are bonded to ceramic honeycomb blocks. These catalysts are designed to operate between 600 °F to 1,200 °F and operating pressures up to 300 psig. Catalytic oxidation systems typically destroy 95% to 99% of CO and VOCs.

Thermal Oxidation (CO Boiler or CO Incinerator)

Thermal oxidation uses the concepts of temperature, time, and turbulence to achieve complete combustion. The combustion process is thought of as occurring in two separate stages: (1) the combustion of fuels, and (2) the combustion of pollutants. Use of a thermal oxidizer is equivalent to adding a combustion chamber where the regenerator vent gas is heated above its ignition temperature. Excess oxygen and additional fuel are supplied to reach this higher temperature and complete the conversion of CO to CO₂.

Partial burn FCCU regenerators operate at or below 1,250 °F. The lower operating temperatures result in regenerator vent gas CO concentrations well in excess of 500 ppmvd. Once the vent gases pass through the thermal oxidizer, CO concentrations are comparable with those of a high temperature regeneration FCCU. For refiners operating a high temperature regeneration FCCU,

a thermal oxidizer is not required because effluent CO concentrations are already less than 500 ppm_{dv}.

There are two types of thermal oxidizers currently used to control CO emissions from a partial burn FCCU regenerator, CO boilers and CO incinerators. CO boilers typically operate at approximately 1,800 °F to ensure complete conversion. CO incinerators typically operate between 1,600 and 2,000 °F. A CO boiler has an advantage over an incinerator in that the boiler also offers heat recovery for purposes of steam generation.

A thermal oxidizer has the disadvantage of being an additional combustion source. This increased fuel combustion, along with the high oxidizer operating temperatures, significantly increases the thermal NO_x emissions from the unit. It should be noted that the RBLC does not indicate the use of CO incinerators to meet BACT requirements for CO control. However, this may be due to an industry preference for the heat recovery capabilities that CO boilers offer.

High Temperature Regeneration

High temperature regeneration, or full combustion regeneration, uses excess oxygen and high operating temperatures, 1,300 to 1,400 °F, to reduce carbon deposits, or coke, on the FCCU catalyst and to complete the conversion of CO to carbon dioxide (CO₂). CO concentrations in high temperature regenerator effluents are usually 50 to 500 ppm_{dv}. Partial burn regenerators operate at approximately 1,250 °F with effluent CO concentrations in excess of 1,000 ppm_{dv}.

High temperature regeneration has some disadvantages. The unit must run at a lower catalyst/oil ratio because of the higher regenerator temperatures. There is an increased requirement for combustion oxygen and regenerators operating at maximum capacity may not be able to handle the increased air demand without upgrading the regenerator blower or installing an oxygen injection system. Also, for regenerators built prior to 1974, the higher operating temperatures may require more expensive metallurgy so as not to exceed the temperature rating of the regenerator internals.

CO Combustion Promoter

Combustion promoter is an additive injected into the circulating catalyst on an as-needed basis primarily to control regenerator afterburn and increase combustion efficiency. As a secondary benefit, combustion promoters slightly increase CO oxidation, thereby potentially reducing CO emissions from the regenerator under certain conditions. The promoter is an alumina or silica-alumina powder typically impregnated with platinum and/or palladium to catalyze the oxidation of CO to CO₂. Because the Ardmore Refinery regenerators control CO emissions to below NSPS levels by either thermal oxidation or full combustion, combustion promoter is not currently used.

2) Eliminate Technically Infeasible Control Technologies

Catalytic Oxidation

The primary problem with catalytic oxidizers is the loss of catalyst activity. They cannot be used on waste gas streams containing significant amounts of PM. PM deposits foul the catalyst and prohibit oxidation. Based on stack testing and expected FCCU upset conditions, the PM

emission rate from the FCCU regeneration unit is such that it is considered technically infeasible to install a catalytic oxidation unit for control of CO emissions.

Though an upstream control device could significantly reduce the amount of PM that routinely passes through a catalytic oxidizer, the unit would still be susceptible to damaging PM concentrations during an FCCU “reversal” which is an upset condition where large quantities of catalyst are emitted. The infeasibility of catalytic oxidation for control of CO from FCCU regenerators was supported by a search of the RBLC Database. The RBLC Database contains no record of catalytic oxidation being successfully used as a CO control for FCCU regenerators, despite the fact that several of the RBLC entries did employ either an ESP or a WS for particulate control. The applicant also contacted equipment vendors and other state agencies who supported the position that catalytic oxidation is not applicable to FCCU regenerators.

High Temperature Regeneration

High temperature regeneration is not a feasible control option for the FCCU No. 1 Regenerator because in the two-regenerator system, the first regenerator is designed to operate in a wet, low temperature environment. Catalyst structure breaks down under high temperature and high moisture conditions, while its structure is protected if the temperature is kept relatively low in a high moisture environment. The second regenerator in the two-regenerator system is designed to operate at high temperature conditions, because the first regenerator has already removed the moisture.

The nature of the two-regenerator system favors high-temperature regeneration in the second regenerator, but prevents its implementation in the first regenerator. High temperature regeneration is not a feasible control technology for the FCCU No. 1 Regenerator.

3) Rank Remaining Control Technologies

Potential CO Control Technologies

Control Technology	Estimated Control Efficiency
Thermal Oxidation	> 95%
Combustion Promoter	Undetermined*

* - This technology is considered an augmentation technology and not necessarily a sufficient technology by itself.

4) Evaluate Remaining Control Technologies and Document Results

Thermal Oxidation (CO Boiler or CO Incinerator)

The most effective feasible control technology, thermal oxidation, is proposed as BACT for the FCCU No. 1 Regenerator. In 1985, TPI installed a boiler and a thermal incinerator to control CO emissions from the FCCU No. 1 Regenerator off-gas. The existing CO Boiler is a thermal oxidizer that converts the CO to CO₂ by combusting the stream with refinery fuel gas at 1,300 to 1,400 °F for about 1.6 to 2.2 seconds. Although a CO Boiler is currently used for the FCCU No. 1 Regenerator, it is not adequately sized to handle the entire flue gas stream during typical operation. As a result, a thermal incinerator is operated in parallel to the CO Boiler to handle the excess flow. The incinerator typically converts the CO to CO₂ with refinery fuel gas at

approximately 1,400 °F for about 2 to 3 seconds. The CO Boiler and Incinerator emissions are vented through a common stack. Historically, the CO Boiler and Incinerator combination have been operated to maximize the steam production from the boiler rather than to achieve a CO emission rate lower than that required by NSPS. Consequently, there was a theoretical possibility that a new CO Boiler designed to handle the entire flue gas flow from the FCCU No. 1 Regenerator could provide greater reduction in CO than the existing system. A vendor quote and emission rate guarantee for a new unit was obtained for comparison to the existing system.

Recent CEMS data from the existing system indicate that it can be operated to achieve the guaranteed emission rate of a new, larger CO boiler. Therefore, the vendor guarantee for a new CO boiler was used only as a benchmark to indicate that the existing system can achieve emission levels comparable to a new thermal oxidation system. Reliance on this data does not imply that a new CO boiler must be used for CO control from the FCCU No.1 Regenerator but that the existing system can be used to achieve BACT.

It should also be noted that a new CO boiler would not be economically justified for control of CO from the FCCU No. 1 Regenerator. The annualized cost per ton of CO removed in comparison to the baseline would be \$9,179. Even when the economic benefit of additional steam production is taken into account, the annualized cost per ton of \$7,449 is clearly higher than the cost per ton of CO removed typically considered justified by a permitting agency. Because a new CO boiler is not economically justified, and because the existing thermal oxidation system can achieve comparable levels of CO control, the baseline CO control using the existing CO boiler and incinerator system is proposed as BACT.

Since there are no solid or liquid waste streams from the CO Boiler, there are no additional adverse environmental impacts to consider. Furthermore, a CO Boiler allows the flue gas from the FCCU No. 1 Regenerator to be used for steam production, thus having positive economic and energy impacts.

CO Combustion Promoter

While use of a combustion promoter can lower the CO content of the flue gas, it also has some drawbacks. The promoter has to be frequently added to the regenerator, two to three times a day, at a rate of 3 to 5 lb/ton of fresh FCCU catalyst. It increases the requirement for combustion air and raises the regenerator temperature; thus, increasing thermal deactivation of the catalyst. Finally, the use of CO combustion promoters can marginally increase NO_x emissions.

Use of CO promoters is not always technically feasible. For regenerators with vent gas CO concentrations already below 500 ppmv, refiners typically will not see appreciable reductions in CO emissions. Use of a CO combustion promoter to control CO emissions from the two stage regenerator at the TPI Ardmore facility is questionable. The first stage is designed to operate as a partial burn stage in an oxygen lean environment. Use of a CO combustion promoter requires excess oxygen and higher operating temperature than are available in the partial burn first stage. The flue gas from this first stage is already routed to a CO Boiler and Incinerator. If the combustion promoter were to decrease the CO concentration of the flue gas fed to the existing CO Boiler, this would mean an increase in supplemental fuel usage, which would cause an increase in thermal NO_x formation from the CO Boiler, since combustion of CO lowers the

adiabatic flame temperature. An increase in NO_x formation and additional fuel requirements are an unacceptable compromise to control CO emissions from the first regenerator stage.

The second stage of the regenerator is a full burn stage and CO concentrations in the flue gas from this stage are already negligible. Therefore, use of a CO combustion promoter will offer no measurable reduction in CO emissions from the refinery's FCCU.

Combined Control Technologies

High temperature regeneration is already in use on the FCCU No. 2 Regenerator, and is not feasible on the FCCU No. 1 Regenerator. Combustion promoter would provide little if any additional CO removal to either regenerator. The FCCU No. 2 Regenerator already typically reduces CO levels to below detection limits. The existing thermal oxidation system would not reduce CO to lower levels with the addition of combustion promoter.

5) Select BACT

The baseline case of thermal oxidation is acceptable as BACT for the FCCU No. 1 Regenerator. Thermal oxidation is the feasible control technology having the highest control efficiency, and can achieve an emission level of 50 ppmv CO. Both the RBLC and communication with vendors by the applicant indicate that CO boilers and incinerators have been used successfully at refineries for CO control from FCCU regenerators.

While the upper range of the theoretical control efficiency for catalytic oxidation is slightly higher than for the baseline case, it is not appropriate for use at the Ardmore Refinery primarily due to the particulate loading from the FCCU regenerator. The BACT analysis indicates that thermal oxidation is the most effective control device that is both commercially available and appropriate for the source.

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
CO	CO boiler and Incinerator	49.9* tons/year	CO continuous emission monitoring systems (CEMS). Compute 12-month rolling total CO emissions using monthly average CO concentration monitored along with monthly average H ₂ O concentration, and monthly average stack gas flow rate.

* - All CO emissions from the FCCU No. 1 Regeneration unit are combined with the FCCU No. 2 Regeneration unit. This number only represents the portion of NO_x contributed by the FCCU No. 1 Regenerator system.

SO₂

The coke on the spent catalyst that enters the FCCU regenerators typically contains some amount of sulfur, left over from the cracked feedstock. Sulfur oxides (SO_x), which consist primarily of SO₂, are formed in the FCCU regenerator by the oxidation of residual sulfur from the feed. At high regenerator temperatures, a small fraction (<10%) of SO₂ is converted to SO₃, a mist that acts as a particulate and can lead to opacity problems. SO₂ emissions can be controlled by removing sulfur from feed or by removing it from the exhaust gases. There are several technologies available for the control of SO₂. Listed below are all the available control technologies for control of SO₂ from the FCCU No. 1 Regenerator. A brief description of the control technologies is also given.

1) Identification of All Available Control Technologies

- Wet Gas Scrubbers (WGS)
- Dry Scrubber (with ESP or baghouse)
- Ionizing Wet Scrubber®
- Hydrotreatment
- DeSO_x Catalyst Additive

Wet Gas Scrubbers

WGSs chemically remove SO₂ emissions using aqueous solutions. Flue gas enters the scrubber where intensive gas/liquid contacting removes sulfur oxides by absorption, neutralization, and partial oxidation to calcium sulfate. The most widely used scrubbing medium is limestone slurry, although some processes utilize other media. Wet scrubbing is a widely used control technology because a high level of efficiency may be achieved and because the costs are low relative to comparable technologies. SO₂ control efficiencies of 90% have been reported. The applicant received vendor information from two of the lead manufacturers of WS for refineries. Each system is briefly described below.

Belco Technologies Corporation

For SO₂ removal, Belco's EDV® Scrubber consists of an open spray tower equipped with proprietary nozzles that disperse a recycled alkaline solution that saturates the incoming stream to promote absorption of SO₂. The cleaned stream is then discharged to the atmosphere, while the scrubbing solution is treated and/or dewatered prior to discharge. The Belco system can remove greater than 90% SO₂.

Monsanto Enviro-Chem Systems, Inc.

The Monsanto DynaWave® system is a Calvert Collision Scrubber with an open design to handle large variations in stream composition. The vendor has indicated that greater than 90% removal of SO₂ is achievable. There are currently no Dynawave systems installed for FCCU off-gas treatment, according to EPA's RBLC and the vendor.

Dry Scrubber (with ESP or baghouse)

In dry scrubbing, a dry sorbent such as hydrated lime and water is injected into a venturi to remove SO₂ from the stream. Typically, lime slurry is injected into a venturi or duct to provide intimate mixing of flue gases and the sorbent. The SO₂ reacts with the sorbent in the wet phase. Inherent heat in the gas stream dries the slurry resulting in dry sorbent, which can be collected with an electrostatic precipitator (ESP) or fabric filter. SO₂ control efficiencies of 70% to 90% have been reported in the literature. The advantages of a dry scrubber include a reduction in water use and the generation of a dry waste that may be recyclable, depending on waste quality and regulatory classification and proximity of potential recyclers. Based on discussions by the applicant with vendors and potential recyclers there is no market value to this waste, but it could potentially be recycled at a cost similar to conventional disposal methods.

Ionizing Wet Scrubber[®]

An Ionizing Wet Scrubber[®] is a type of WS that combines ionization with a chemical scrubbing agent. Adding ionization to a WS does not improve the efficiency of the scrubber to remove SO₂ from a gas stream. Ionization only improves the particulate removal capacity of the scrubber. From the perspective of SO₂ removal, a WS and an Ionizing Wet Scrubber[®] are identical technologies, and therefore are not considered separately for SO₂ removal in this report.

Hydrotreatment

Hydrotreating is generally used to remove materials from feedstock by selectively reacting these materials with hydrogen in a catalyst bed at high temperature. Hydrotreating reduces the formation of SO_x by reducing the overall sulfur content of the feedstock, and efficiencies vary depending on the sulfur content of the feedstock. Although one source reports that the theoretical removal efficiency of a hydrotreatment unit is estimated to be 50% to 70% for heavy desulfurization, the Ardmore Refinery hydrotreatment is designed to reduce the feedstock sulfur content from 2 wt% to 0.3 wt% for a potential control efficiency of 85%.

DeSO_x Catalyst Additive

Sulfur oxide transfer catalysts, or DeSO_x catalysts, are injected into the regenerator in small amounts to reduce SO_x emissions by about 40%. The DeSO_x additive adsorbs SO₂ and SO₃, which react on the surface with a metal oxide in the additive to form a metal sulfate. In the FCCU riser, the metal sulfate reacts with hydrogen to form H₂S, which is passed to a Sulfur Recovery Unit (SRU) for removal. The Ardmore Refinery hydrotreats its FCCU feed to reduce downstream SO₂ emissions rather than using a DeSO_x catalyst.

2) Eliminate Technically Infeasible Control Technologies

None of the SO₂ control technologies considered were eliminated as technically infeasible.

3) Rank Remaining Control Technologies

Potential SO₂ Control Technologies

Control Technology	Estimated Control Efficiency
Wet Gas Scrubber	>90%
Dry Gas Scrubber (with ESP*)	70% to 90%
Hydrotreatment	50% to 85%
DeSO _x Additive	38%

* - Although cyclones may achieve much higher control efficiencies on streams with large particle sizes, the particulate emissions for the FCCU and the CO Boiler consist mainly of small-size (<10 μ) particles. A cyclone is not expected to provide high efficiency particulate removal for this application.

4) Evaluate Remaining Control Technologies and Document Results

Hydrotreatment is already in use at the Ardmore Refinery and is considered the base case. Therefore, all other SO₂ controls are considered in addition to emission control benefits already provided by this control method. The most efficient SO₂ control option among the feasible technologies is a WS. Since this is considered an add-on control method that treats the exhaust gases from the regenerators, this method is evaluated for controlling both FCCU regenerator streams together and not separately. Each of the two proprietary systems has similar economic, environmental, and energy considerations.

Each of the two WS options requires a separate purge treatment unit (PTU) to treat the scrubbing liquid purge stream from the scrubber. In each case, this neutral purge stream is estimated to be approximately 20 gallons per minute (gpm) with chemical oxygen demand less than 100 ppm. The liquid waste stream quantity and composition will not overburden the refinery's existing wastewater treatment system. The additional electrical utilities and (makeup) water required to operate the WS are considered insignificant in comparison to the total refinery electrical and water demands. Because the most efficient option is being proposed as BACT, further discussion of the remaining technologies is not warranted. Also, since hydrotreatment of the feedstock and use of the WS are proposed as BACT, combined control technologies is also not discussed further.

The Belco EDV scrubber uses the concepts of saturation, expansion, condensation, and filtration to achieve SO₂ removal efficiencies of 90% or greater. The FCCU regenerator flue gas enters the EDV scrubber horizontally and is quenched and saturated in an open spray tower using a proprietary water spray nozzle design. SO₂ absorption takes place in the vertical portion of the spray tower. In the spray tower, the scrubbing liquid pH is generally controlled at pH 6 to 7 with an alkali. The staged intensive gas/liquid contacting provides the required desulfurization. The number of stages in the spray tower is determined by the desulfurization requirements.

The baseline emission rate was calculated based on stack tests extrapolated out to the maximum allowable throughput and sulfur concentrations of 30,000 bbl/day and 0.3 wt % sulfur in the feedstock. Baseline SO₂ emissions for FCCU No. 1 regenerator were based on the January 23, 1998, test results. Baseline SO₂ emissions for FCCU No. 2 regenerator were based on the August 12, 1999, test results. Installation of a Belco EDV scrubber would reduce emissions by 90%, incurring an average annual control cost for both regenerator streams of \$3,366/ton SO₂ removed.

5) Select BACT

By and large, WS are considered to be a very reliable form of SO₂ control for FCCUs. The primary adverse environmental impacts associated with the use of this WS are:

- Increased water usage
- Increased wastewater treatment
- Increased solid waste disposal

Wet gas scrubbing is an accepted form of SO₂ control for an FCCU regenerator despite these types of adverse collateral impacts. It is considered a MACT floor technology for the recently proposed 40 CFR Part 63 Subpart UUU - *NESHAP for Petroleum Refineries - Catalytic Cracking (Fluid and Other) Units, Catalytic Reforming Units and Sulfur Plants*. Therefore, hydrotreatment and a Belco WS are acceptable as BACT for SO₂ from the FCCU No. 1 regenerator.

FCCU No. 1 Regeneration unit Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
SO ₂	Hydrotreatment and Wet Scrubber	137.4* tons/year	SO ₂ continuous emission monitoring systems (CEMS). Compute 12-month rolling total SO ₂ emissions using monthly average SO ₂ concentration monitored along with monthly average H ₂ O concentration, and monthly average stack gas flow rate.

FCCU No. 2 Regeneration unit
Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
SO ₂	Hydrotreatment and Wet Scrubber	65.0* tons/year	SO ₂ continuous emission monitoring systems (CEMS). Compute 12-month rolling total SO ₂ emissions using monthly average SO ₂ concentration monitored along with monthly average H ₂ O concentration, and monthly average stack gas flow rate.

* - All SO₂ emissions from the FCCU No. 1 and No. 2 Regeneration units are combined together in one stack the individual numbers only represents the portion of SO₂ emissions contributed by each regenerator.

PM₁₀

Control of PM must be considered for the FCCU No. 1 Regenerator. PM₁₀ is one of the primary pollutants from FCCU regenerators. NSPS, Subpart J sets the emission limit of PM₁₀ from FCCU's at 1.0 lb/1000 lb coke burn-off. The FCCU No. 1 Regenerator PM emissions consist of the fine catalyst particles that have not been captured by the FCCU cyclone systems. The cyclone system is likely 99% efficient for particles greater than 10 microns in size. Therefore, this analysis focuses on PM₁₀. There are several technologies available for the control of PM₁₀. Listed below are all the available control technologies for control of PM₁₀ from the FCCU No. 1 Regenerator. A brief description of the control technologies not previously described for control of PM₁₀ emissions is also given.

1) Identification of All Available Control Technologies

- Porous Sintered Media
- Baghouse
- Dry or Wet Scrubber
- Electrostatic Precipitator
- Ionizing Wet Scrubber®
- Cyclone

Wet Gas Scrubber

The applicant has received vendor information from two of the lead manufacturers of WSs for refineries. Each system removes both SO₂ and particulate and is briefly described below. Since this is considered an add-on control method that treats the exhaust gases from the regenerators, this method is evaluated for controlling both FCCU regenerator streams together and not separately.

Belco Technology Corporation

For particulate removal, Belco's EDV[®] Scrubber consists of an open spray tower equipped with proprietary nozzles that disperse a recycled alkaline solution that saturates the incoming stream to promote impaction of large particles. For particulates, a second filtering module in series causes water from the saturated atmosphere to condense on the particles, making them easier to capture. The cleaned stream is then discharged to the atmosphere, while the scrubbing solution is treated and/or dewatered prior to discharge. The Belco system can achieve greater than 90% PM₁₀ removal.

Monsanto Enviro-Chem Systems, Inc.

The Monsanto DynaWave[®] system is a Calvert Collision Scrubber with an open design to handle large variations in stream composition. The vendor has indicated that greater than 90% removal of PM₁₀ is achievable. There are currently no DynaWave systems installed for FCCU off-gas treatment, according to RBLC and the vendor.

2) Eliminate Technically Infeasible Control Technologies

Porous Sintered Media

A California refiner has tested a porous sintered metal filter system as a FCCU third stage underflow filter. This underflow system, however, constituted no more than 3.0% of the total FCCU regenerator flue gas flow. Porous sintered metal filters have not been tested or implemented to date for PM₁₀ control from a full scale FCCU regenerator. This type of filter is expected to incur problems with FCCU startup and reversals and the filter media is not considered compatible with the high flow rates associated with an FCCU. Given the lack of commercially demonstrated reliability of this technology in a full-scale operation, it is considered a technically infeasible option for application to the FCCU regenerators.

Baghouse

A baghouse is considered a technically infeasible option for control of the FCCU No. 1 Regenerator or CO Boiler/Incinerator PM for this facility for a variety of reasons. The first is the high temperature of the exhaust gases. Normal exit gas temperatures from the FCCU regenerator and in the combined CO Boiler/incinerator stack are 1,100 °F and 900 °F, respectively. The primary reasons why baghouses are not used for FCCU regenerator or CO boiler applications are the temperature and moisture ranges of the emissions. The most readily available fabrics become damaged at temperatures over 500 °F, although some ceramic fabrics may withstand higher temperatures, moisture is a more significant problem because it causes "blinding" of the fabric bags. The combined CO Boiler/Incinerator stack gas contains approximately 11% water.

Representatives from AAF International, Donaldson-Torit Industries and Air Cleaning Specialists were contacted by the applicant for quotes for a baghouse for this type of application. AAF, Donaldson-Torit, and Air Cleaning Specialists declined to bid, stating that equipment was not available to address this type of source. Both temperature and flow rate were cited as factors. Born Environmental noted that the fabric filter material they generally used would withstand

sustained temperatures of approximately 500 °F. Fabric filters that could withstand sustained temperatures of 850 °F could be obtained for approximately three to four times the cost of the standard fabric (approximately \$60-\$80/ft², in comparison to \$20/ft²). Temperatures significantly above these levels would result in damage to the filter bags or fire.

More importantly, although particulate loadings under baseline conditions would not be expected to result in undue damage to the filter bags, high loadings of abrasive catalyst associated with FCCU reversals would result in damage whether the baghouse was placed before or after the existing CO Boiler. The vendor indicated that any upsets including reversals, which involved significantly greater quantities of PM than the 40.1 lb/hr reported by the January 1998 stack test, would require a shutdown or bypass of the unit.

Finally, a review of the RBLC bulletin board and communications with equipment vendors and the state contacts by the applicant did not result in identification of a single instance where baghouses had been applied successfully in practice for the control of PM from FCCU regenerators. Because a vendor could provide a baghouse for this application, it is considered commercially available. However, because they are not a demonstrated technology for a similar source, and because leading industrial vendors declined to provide an unqualified quote, the use of a baghouse was considered not applicable to this type of source.

Cyclone

Because the FCCU regenerator already contains two stages of cyclones for recovering catalyst, additional cyclones (in series or in parallel) would be redundant. Since cyclones are not efficient for removal of small particles, redundancy is not expected to provide additional control of small particles.

3) Rank Remaining Control Technologies

Potential PM₁₀ Control Technologies

Control Technology	Estimated Control Efficiency
Wet Gas Scrubber	>90%
Wet Gas Scrubber with ESP*	>90%
Ionizing Wet Scrubber®	<90% estimated

* - A WS is selected for SO₂ control. Because a WS is also effective at PM₁₀ control, an ESP is a redundant particulate control technology and must be considered in addition to the WS and not as a PM₁₀ technology by itself.

4) Evaluate Remaining Control Technologies and Document Results

Consistent with the BACT process the two most efficient options were evaluated further: a WS alone and a WS combined with an ESP system. Thus, energy, environmental, and economic factors were assessed to select the BACT for PM₁₀. An ESP alone is not considered because the WS is proposed as BACT for SO₂ control. Since a WS is also an efficient PM₁₀ control device, an ESP would be a redundant particulate control technology and must be considered in combination with the WS rather than as a PM₁₀ technology by itself. Energy requirements were

taken into consideration to estimate annual operating costs per ton removed. Using an ESP in addition to a WS, greatly increases the energy requirements for a marginal increase in PM₁₀ removal. Assuming a WS alone would only reduce total annual tons of PM₁₀ from 594 to less than 111 TPY, combining a WS with a 90% efficient ESP (for the front half of the sampling train) would reduce PM₁₀ to about 69 TPY. The capital cost for a WS including site preparation costs is estimated to be about \$19.8 million and for a WS combined with an ESP would be approximately \$25.8 million. Taking into account both the annual operating costs and the initial capital costs, the annual cost per ton of PM₁₀ removed for these two options are \$12,675/ton and \$14,133/ton respectively. Therefore, the annual cost for the combined WS-ESP option exceeds the costs incurred by other sources. Accordingly, this option is eliminated based on energy and economic considerations. The environmental benefit of additional PM₁₀ removal by an ESP cannot be justified given the economic penalty the ESP would impose. This is illustrated by considering the incremental cost of reducing PM₁₀ emission further from 111 TPY with a WS to 69 TPY. Assuming additional removal of 42 TPY with an ESP, the incremental addition to the annual cost for this additional removal, referred to as the marginal cost effectiveness, is nearly \$31,000 for a 90% efficient ESP system, which is clearly exorbitant.

WGSs are, therefore, more cost effective than an ESP and WS combination. A WS would be characterized by the energy and environmental aspects noted above. Two WS vendors (Belco and Monsanto) have specified WS systems that are reported to control PM₁₀ to greater than 90% and potentially up to 99%, respectively. The four most recent RBLC FCCU technology determinations have been WSs.

The cost effectiveness of the PM control scenarios was evaluated in detail for the purpose of this analysis and are summarized below.

Cost Effectiveness of PM₁₀ Control Options

No.	Control Scenario	PM ₁₀ * Removal (ton/yr)	Annualized PM ₁₀ Cost Effectiveness** (\$/ton removed)	Marginal Cost Effectiveness compared to Scenario 2 (\$/ton)	Marginal Cost Effectiveness compared to Scenario 3 (\$/ton)
1	90% WS+ 99% ESP	530	\$15,126	\$145,767	\$40,921
2	90% WS+ 90% ESP	526	\$14,133	---	\$30,936
3	90% WGS	484	\$12,675	---	---

* - Includes front and back half of the sampling train and an estimated control of 50% for the back half of the sampling train for the wet scrubber.

** - The Belco WS quote, which provided the most complete accounting of installed capital costs, was used in the calculations.

The Scenario 1 and Scenario 2 cost effectiveness values of \$15,126/ton and \$14,133/ton, respectively, are considered economically unreasonable and have not been previously imposed by AQD for similar applications. The high cost of the WS alone, however, is warranted since it also removes SO₂ emissions.

5) Select BACT

A WS is also proposed as BACT for PM₁₀ control on the combined FCCU regenerators stack. A WS is the most effective commercially available and appropriate control device for the FCCU regenerators at the Ardmore Refinery. The PM₁₀ control efficiency for the proposed WS is 90%. The RBLC database shows that four analyses made during the time that the BACT analysis was submitted proposed WS as BACT for PM₁₀. Three of these are in combination with cyclones, which are already in place at the Ardmore Refinery.

As discussed for SO₂ control, the alternative of two WSs, one for each FCCU stack, was also evaluated. The two-scrubber scenario would not remove a greater percentage of PM₁₀ than the single-scrubber scenario, but would be far more expensive. The cost per ton of PM₁₀ removed when two scrubbers are used is \$25,350, in comparison to \$12,675 for the single-scrubber scenario. Given that two scrubbers do not remove more PM₁₀ than a single scrubber, the use of a WS on each individual FCCU stack is not economically justified.

FCCU No. 1 Regeneration unit
Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
PM ₁₀	Cyclones and Wet Scrubber (>90% efficient)	26.2* tons/year	Monitor 24-hour average WS liquid flow rate and pressure drop as parametric indicators of desired control efficiency. Indicator ranges to be determined based on future performance tests on actual installed control devices.

FCCU No. 2 Regeneration unit
Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
PM ₁₀	Cyclones and Wet Scrubber (>90% efficient)	20.4* tons/year	Monitor 24-hour average WS liquid flow rate and pressure drop as parametric indicators of desired control efficiency. Indicator ranges to be determined based on future performance tests on actual installed control devices.

* - All PM₁₀ emissions from the FCCU No. 1 and No. 2 Regeneration units are combined together in one stack the individual numbers only represents the portion of PM₁₀ emissions contributed by each regenerator. The BACT analysis only represents the front-half of the PM₁₀ sampling train.

FCCU No. 2 Regenerator

Since all of the pollutants and related control technologies for the FCCU No. 1 Regenerator and the FCCU No. 2 Regenerator are the same, all of the determinations for the FCCU No. 2 Regenerator will start from the eliminated technically infeasible control techniques. Also, since SO₂ and PM₁₀ emissions from the FCCU No. 2 Regenerator were addressed with the FCCU No. 1 Regenerator, they are not covered in this section also. Only emissions of NO_x and CO are addressed in this section.

NO_x**1) Eliminate Technically Infeasible Control Technologies****SCR**

SCR is considered a technically infeasible option for NO_x control for the FCCU No. 2 Regenerator for the same reasons it was determined infeasible for the FCCU No. 1 Regenerator.

ULNB and LNB

Neither LNBs nor ULNBs are applicable to the FCCU No. 2 Regenerator because the regenerator does not employ burners to burn fuel. Because LNBs and ULNBs are not effective at reducing NO_x other than that produced by the burning of fuel, ULBs and LNBs are not considered a feasible control technology for the FCCU No. 2 Regenerator.

Flue Gas Recirculation

FGR is not a feasible technology for the control of NO_x from the FCCU No. 2 Regenerator. The FCCU No. 2 Regenerator is designed to run at high temperatures to oxidize CO to CO₂. Because FGR is designed to reduce temperature to prevent the formation of thermal NO_x, it would reduce the FCCU No. 2 Regenerator's ability to function as designed and its ability to oxidize CO. In addition, even if FGR was implemented in the FCCU No. 2 Regenerator, it is not expected to be very effective due to the low temperature differential that would be expected across the unit. Because heat is not removed from the flue gas to produce steam, as is the case in a boiler, the temperature exiting the FCCU is not expected to be significantly lower than the temperature of the gas in the reaction chamber. Recirculating the flue gas to the regenerator inlet would not have the desired effect of lowering the reaction temperature and reducing the formation of thermal NO_x.

Steam Injection

The use of steam injection is not feasible for use on the FCCU No. 2 Regenerator because it would interfere with the operation of the unit. The FCCU No. 2 Regenerator is able to operate at a higher temperature than the FCCU No. 1 Regenerator because it operates dry. The catalyst's structure breaks down in a combination of moisture and heat. The FCCU No. 2 Regenerator is operated dry so that it can be operated at higher temperatures (full burn) without breakdown of the catalyst structure. Introduction of steam or water into the FCCU No. 2 Regenerator would cause the breakdown of catalyst under current operating conditions. If the FCCU No. 2

regenerator were to be modified to accommodate steam injection, it would no longer be able to operate as a full burn regenerator and would not thermally oxidize CO as it was designed.

2) Rank Remaining Control Technologies

Potential NO_x Control Technologies

Control Technology	Estimated Control Efficiency
SNCR	30 to 60%
Hydrotreatment of Feedstock	50%
Low Excess Air	1% to 15%
Reburning	Negligible
Staged Combustion	Negligible

3) Evaluate Remaining Control Technologies and Document Results

SNCR

The annualized cost per ton of NO_x removed with SNCR installed on the No. 2 FCCU regenerator alone would be \$7,710. The cost effectiveness of this option exceeds the costs incurred by other sources during the time frames that the BACT was submitted and which are regulated by AQD.

The relatively high cost per ton of NO_x removed is due in large part to the fact that the gas stream must be heated prior to introduction to the SNCR system. The annual estimated cost of heating the FCCU No. 2 Regenerator off-gas is nearly \$100,000. In addition to the economic impacts, heating the gas stream would introduce additional pollutants to the stream, increasing the load to downstream pollution control devices, or if SNCR is downstream of pollution control devices, additional pollutants would be discharged to the atmosphere. Operating the SNCR at a temperature lower than the optimum range of 1,700 °F to 1,900 °F will result in the emission of unreacted urea, known as “urea slip.”

Because the environmental and economic impacts of SNCR are unjustifiably high for the FCCU No. 2 Regenerator alone, SNCR is not an appropriate technology for use on the No. 2 FCCU regenerator alone.

Hydrotreatment of Feedstock

Hydrotreatment is already being used to treat the feedstock for the FCCU system. This reduces the amount of nitrogen containing materials in the coke and the emissions of NO_x and other nitrogen compounds from combustion of the coke in the regenerator. This is considered the baseline control technology for the FCCU No. 2 Regenerator. All other control technologies were reviewed in addition to this control technology.

Low Excess Air (LEA)

The No. 2 Regenerator is a full burn regeneration unit. It basically uses air injection into the regenerator to combust the coke from the catalyst. Use of LEA in the FCCU No. 2 Regenerator would cause the regenerator to no longer be able to operate as a full burn regenerator and would

not thermally oxidize CO as it was designed. The amount of air into the regenerator is carefully controlled to keep the regenerator temperature below a certain level.

Reburning & Staged Combustion

Because of the basic design of the regenerator, reburning and staged combustion are not considered viable control technologies. There are no burners in the regenerator and combustion of the coke in the FCCU No. 2 regenerator is effected by adding air to the regenerator.

Combination of FCCU Regenerator Streams

These scenarios were addressed in the "FCCU No. 1 Regenerator" section.

Control Technologies Combinations

There are no applicable control technology combinations for the FCCU No. 2 Regenerator.

4) Select BACT

The baseline case of feed stock hydrotreatment is acceptable as BACT for the FCCU No. 2 Regenerator.

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
NO _x	Feedstock Hydrotreatment	140.8* tons/year	NO _x continuous emissions monitoring systems (CEMS). Compute 12-month rolling total NO _x emissions using monthly average NO _x concentration monitored along with monthly average H ₂ O concentration, and monthly average stack gas flow rate.

* - All NO_x emissions from the FCCU No. 2 Regeneration Unit are combined with the FCCU No. 1 Regeneration Unit. This number only represents the portion of NO_x contributed by the FCCU No. 2 Regenerator.

CO

1) Eliminate Technically Infeasible Control Technologies

Catalytic Oxidation

SCR is considered a technically infeasible option for CO control for the FCCU No. 2 Regenerator for the same reasons it was determined infeasible for the FCCU No. 1 Regenerator.

2) Rank Remaining Control Technologies

Potential CO Control Technologies

Control Technology	Estimated Control Efficiency
High Temperature Regeneration	> 95%
Combustion Promoter	Undetermined*

* - This technology is considered an augmentation technology and not necessarily a sufficient technology by itself.

3) Evaluate Remaining Control Technologies and Document Results

High Temperature Regeneration

The FCCU No. 2 Regenerator uses high temperature regeneration to oxidize CO. The FCCU No. 2 Regenerator is extraordinarily efficient at oxidizing CO. In a January 1998 stack test, CO was measured in three runs, two of which did not report CO in detectable levels, the other reported a concentration of 0.04 ppmv. Because high temperature regeneration is extremely efficient for removal of CO from the FCCU No. 2 Regenerator, replacement of, or addition to high temperature regeneration is not warranted for CO control.

CO Combustion Promoter

Use of CO promoters is not always technically feasible. For regenerators with vent gas CO concentrations already below 500 ppmv, refiners typically will not see appreciable reductions in CO emissions. The FCCU No. 2 Regenerator is a full burn regenerator and CO concentrations in the flue gas from this stage are already negligible. Therefore, use of a CO combustion promoter will offer no measurable reduction in CO emissions from the refinery's FCCU.

Combined Control Technologies

High temperature regeneration is already in use on the No. 2 regenerator. Combustion promoter would provide little if any additional CO removal. The No. 2 regenerator already typically reduces CO levels to below detection limits. The existing thermal oxidation system would not reduce CO to lower levels with the addition of combustion promoter.

4) Select BACT

The baseline case of high temperature regeneration is acceptable as BACT for the FCCU No. 2 Regenerator.

Proposed BACT Controls, Emission Limits, and Monitoring

Pollutant	Selected Technology	Emissions Limits (12-month rolling total)	Proposed Monitoring
CO	High Temperature Regeneration	4.2* tons/year	CO continuous emission monitoring systems (CEMS). Compute 12-month rolling total CO emissions using monthly average CO concentration monitored along with monthly average H ₂ O concentration, and monthly average stack gas flow rate.

* - All CO emissions from the FCCU No. 2 Regeneration unit are combined with the FCCU No. 1 Regeneration unit. This number only represents the portion of CO contributed by the FCCU No. 2 Regenerator.

B. Air Quality Impacts

The Valero Ardmore Refinery is located in Carter County, which is currently designated attainment or unclassified for all criteria pollutants, and there are no areas classified as non-attainment within 50 kilometers of the refinery. As part of the Refinery's Title V application due diligence, it was determined that past modifications at the Ardmore Refinery may have resulted in emission increases of NO_x, CO, PM₁₀, SO₂, and VOC sufficient to trigger the PSD requirements codified in 40 CFR Part 52.

PSD is a construction-permitting program designed to ensure air quality does not degrade beyond the NAAQS or beyond specified incremental amounts above a prescribed baseline level. The PSD rules set forth a review procedure to determine whether a source will cause or contribute to a violation of the NAAQS or maximum increment consumption levels. If a source has the potential to emit a pollutant above the PSD significance levels, then they trigger this review process. EPA has provided modeling significance levels (MSL) for the PSD review process to determine whether a source will cause or contribute to a violation of the NAAQS or consume increment. Air quality impact analyses were conducted to determine if ambient impacts would be above the EPA defined modeling and monitoring significance levels. If impacts are above the MLS, a radius of impact (ROI) is defined for the facility for each pollutant out to the farthest receptor at or above the significance levels. If a radius of impact is established for a pollutant, then a full impact analysis is required for that pollutant. If the air quality analysis does not indicate a radius of impact, no further air quality analysis is required for the Class II area.

ERM prepared an air quality analysis in accordance with the procedures and methodology presented, which are consistent with guidance provided by the Oklahoma Department of Environmental Quality (ODEQ) and Environmental Protection Agency (EPA). The results of this air quality analysis show that the proposed emissions under this permit will not cause or contribute to an exceedance of the NAAQS or significant PSD increment consumption.

VOC is not limited directly by NAAQS. Rather, it is regulated as an ozone precursor. EPA developed a method for predicting ozone concentrations based on VOC and NO_x concentrations in an area. The Scheffe tables utilize increases in NO_x and VOC emissions to predict increases in ozone concentrations. The ambient impacts analysis utilized the tables from "VOC/NO_x Point Source Screening Tables" (Richard Scheffe, OAQPS, September, 1988).

Modeling Methodology

The refined air quality modeling analyses for the Valero Ardmore Refinery employed USEPA's Industrial Source Complex (ISC3) (Version 02035) model (USEPA, 1995a). The ISC3 model is recommended as a guideline model for assessing the impact of aerodynamic downwash (40 CFR 40465-40474). The regulatory default option was selected such that USEPA guideline requirements were met.

The stack height regulations promulgated by USEPA on July 8, 1985 (50 CFR 27892), established a stack height limitation to assure that stack height increases and other plume dispersion techniques would not be used in lieu of constant emission controls. The regulations specify that Good Engineering Practice (GEP) stack height is the maximum creditable stack height which a source may use in establishing its applicable State Implementation Plan (SIP) emission limitation. For stacks uninfluenced by terrain features, the determination of a GEP stack height for a source is based on the following empirical equation:

$$H_g = H + 1.5L_b$$

where:

H_g = GEP stack height;

H = Height of the controlling structure on which the source is located, or nearby structure; and

L_b = Lesser dimension (height or width) of the controlling structure on which the source is located, or nearby structure.

Both the height and width of the structure are determined from the frontal area of the structure projected onto a plane perpendicular to the direction of the wind. The area in which a nearby structure can have a significant influence on a source is limited to five times the lesser dimension (height or width) of that structure, or within 0.5 mile (0.8 km) of the source, whichever is less. The methods for determining GEP stack height for various building configurations have been described in USEPA's technical support document (USEPA, 1985).

The heights of some of the exhaust stacks at the refinery were evaluated to determine if they are less than respective GEP stack heights, a dispersion model to account for aerodynamic plume downwash was necessary in performing the air quality impact analyses to account for downwash.

Since downwash is a function of projected building width and height, it is necessary to account for the changes in building projection as they relate to changes in wind direction. Once these projected dimensions are determined, they can be used as input to the ISC3 model.

In October 1993, USEPA released the Building Profile Input Program (BPIP) to determine wind direction-dependent building dimensions. The BPIP program was used to determine the wind direction-dependent building dimensions for input to the ISC3 model.

The BPIP program builds a mathematical representation of each building to determine projected building dimensions and its potential zone of influence. These calculations are performed for 36 different wind directions (at 10 degree intervals). If the BPIP program determines that a source is under the influence of several potential building wakes, the structure or combination of structures that has the greatest influence ($H + 1.5 L_b$) is selected for input to the ISC3 model. Conversely, if no building wake effects are predicted to occur for a source for a particular wind direction, or if the worst-case building dimensions for that direction yield a wake region height less than the source's physical stack height, building parameters are set equal to zero for that wind direction. For this case, wake effect algorithms are not exercised when the model is run. The building wake criteria influence zone is $5 L_b$ downwind, $2 L_b$ upwind, and $0.5 L_b$ crosswind. These criteria are based on recommendations by USEPA. The building cavity effects were then used in the modeling analysis for the refinery. For this analysis, the first step was to determine the building cavity height based on the formula:

$$h_c = H + 0.5L_b$$

where:

- h_c = GEP stack height;
- H = Height of the controlling structure on which the source is located, or nearby structure; and
- L_b = Lesser dimension (height or width) of the controlling structure on which the source is located, or nearby structure.

If the stack height was greater than or equal to the cavity height, the cavity effect would not affect the downwind maximum impacts.

The meteorological data used in the dispersion modeling analyses consisted of five years (1986, 1987, 1988, 1990, and 1991) of hourly surface observations from the Oklahoma City, Oklahoma, National Weather Service Station and coincident mixing heights from Oklahoma City (1986-1988) and Norman, Oklahoma (1990 and 1991).

Surface observations consist of hourly measurements of wind direction, wind speed, temperature, and estimates of ceiling height and cloud cover. The upper air station provides a daily morning and afternoon mixing height value as determined from the twice-daily radiosonde measurements. Based on NWS records, the anemometer height at the Oklahoma City station during this period was 6.1 meters.

Prior to use in the modeling analysis, the meteorological data sets were downloaded from the USEPA Support Center for Regulatory Air Models (SCRAM) website. This data was scanned for missing data, but no missing data were found. USEPA used the procedures outlined in the USEPA document, "Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models," were used to fill gaps of information for single missing days. For larger periods of two or more missing days, seasonal averages were used to fill in the missing periods. The USEPA developed rural and urban interpolation methods to account for the effects of the surrounding area on development of the mixing layer boundary. The rural scheme was used to determine hourly mixing heights representative of the area in the vicinity of the refinery.

The urban/rural classification is used to determine which dispersion parameter to use in the model. Determination of the applicability of urban or rural dispersion is based upon land use or population density. For the land use method the source is circumscribed by a three kilometer radius circle, and uses within that radius analyzed to determine whether heavy and light industrial, commercial, and common and compact residential, comprise greater than 50 percent of the defined area. If so, then urban dispersion coefficients should be used. The land use in the area of the proposed facility is not comprised of greater than 50 percent of the above land use types and is considered a rural area.

The refined modeling used a nested Cartesian grid. Receptors were placed no greater than 50 meters apart along the boundary. From the fenceline, a 100-meter grid of receptors extended out to 500 meters. A 500-meter grid extended beyond this grid, out to 2.5 kilometers from the site. A 1,000-meter grid extended beyond this grid, out to 10 kilometers from the site. Beyond that, a spacing of 2.5 kilometers was used extending out to 50 kilometers from the facility. This modeling was used to define the radius of significant impact for each pollutant. All receptors were modeled with actual terrain data. The terrain data was taken from United States Geologic Survey (USGS) 7.5-minute Digital Elevation Model Files. A total of 20 modeling runs were performed for this modeling analysis.

Summary of Modeling Emission Inventory

For each modeling analysis type (e.g., Preliminary Analysis, NAAQS or PSD Increment) varying modeling emission inventories were developed (e.g. contemporaneous increases, increases over baseline, or total emissions). However, the stack parameters for point sources in each inventory were modeled using actual stack parameters, with the exception of some pseudo-point type sources (e.g., tanks), that were modeled to represent their non-buoyant, low velocity type emissions. A discussion of the sources included in each modeling analysis is presented below.

Preliminary Analysis

Typically for PSD Preliminary Analyses, contemporaneous changes (i.e., changes within three years of the triggering event) in emissions are modeled. However, as mentioned previously, an evaluation of historic changes at the Refinery showed that changes at the facility that occurred as early as 1982 may have required permitting under PSD regulations. For the purposes of this modeling project, the contemporaneous changes in emissions modeled in the significance analysis were defined as the proposed emissions under this permit application minus the two-year average past actual emissions for mid-1980 to mid-1982. Tabulations of the emission inventories for the PSD preliminary analyses of NO₂, SO₂, PM₁₀, and CO were provided in the application.

On-Property Sources – Full Impact Analyses

Available air permitting and emissions inventory documentation was reviewed to identify on-property sources of NO₂, SO₂, and PM₁₀. For the NAAQS analyses, the identified on-property sources were modeled at their proposed allowable emission rates. For the PSD Increment analyses, the identified on-property sources were modeled at their increment-consuming emission rate. The increment-consuming emission rate was estimated by subtracting the historical two-year average emission rate from the proposed allowable emission rate. The on-property source emission inventories for the Full Impact Analyses were provided in the application.

Off-Property Sources – Full Impact Analyses

Off-property sources located within a radius defined by the AOI plus 50 kilometers were included in the Full Impact PSD Increment and NAAQS Analyses that were triggered by the Preliminary Analyses. An ODEQ database retrieval, ODEQ emission inventory reports, and ODEQ permitting files were used to identify applicable sources to be included in the modeling analyses and their respective stack parameters and emission rates. Off-property sources other than those at Atlas were assumed to be increment consuming, and allowable emission rates were included in the model.

Due to its proximity to the Refinery (contiguous to the south), sources at Atlas were evaluated to assess whether they were increment-consuming sources or whether they were existing emission sources prior to the minor source baseline date. Information from Atlas permit applications was used to assess construction, reconstruction, and modification dates for Atlas' emission sources. A summary of the analysis that were used to evaluate the sources included in the PSD Increment Analysis for each pollutant and a summary of the off-property modeling emission inventories for the impact analyses (PSD Increment and NAAQS) were provided in the application.

Preliminary Analysis

The first step in the PSD modeling analysis was the Preliminary Analysis (AOI analysis). In this analysis net emission increases were modeled to evaluate whether the resultant highest predicted concentrations for each pollutant averaging period combination were of regulatory significance.

These results were also used to evaluate the extent of the modeling analysis that would be required. A significant receptor file was created using either the ISCST3 “MAXIFILE” output option and/or BEE-Line’s graphical (*.grf) interface for the ISCST3 model. This file contained each predicted concentration that was greater than the MSL, the receptor location, time, date and year. The results of the Preliminary Analysis were used to evaluate whether a Full Impact Analysis was required to define the resultant AOI for modeling purposes, and to evaluate whether a full analysis would be required. The results of the Preliminary Analysis are summarized below.

Preliminary Analysis Results

Pollutant	Averaging Period	Max. Predicted Concentration ($\mu\text{g}/\text{m}^3$)	PSD MSL ($\mu\text{g}/\text{m}^3$)	AOI (km)	Monitoring Exemption Levels ($\mu\text{g}/\text{m}^3$)
NO ₂	Annual	11.0	1	4.0	14
CO	1-hour	1,255	2,000	N/A	N/A
	8-hour	331.0	500	N/A	575
SO ₂	3-hour	84.0	25	0.9	N/A
	24-hour	10.2	5	0.8	13
	Annual	0.2	1	N/A	N/A
PM ₁₀	24-hour	23.5	5	2.1	10
	Annual	1.7	1	2.0	N/A

The results predicted ambient CO concentrations to be less than the MSL for the both the 1-hour and 8-hour averaging periods and the ambient SO₂ concentrations to be less than the MSL for the annual averaging period. Thus a Full Impact Analysis was not required for CO (1-hour or 8-hour) or for SO₂ (annual). The predicted ambient concentrations for NO₂ (annual), SO₂ (3-hour and 24-hour), and PM₁₀ (24-hour and annual) averaging periods were greater than the MSL. Since regulatory-significant concentrations were predicted for NO₂, PM₁₀, and SO₂ for the applicable averaging periods, a Full Impact Analysis was performed for each. The Full Impact Analysis included only those receptors where the preliminary modeled concentrations were predicted to be significant.

Full Impact Analysis (PSD Increment and NAAQS)

A Full Impact Analysis was performed to predict ambient concentrations for comparison to the NAAQS and PSD increment. This modeling analysis addressed emissions from the Valero Refinery’s sources and off-property sources within the radius defined by the AOI plus 50 kilometers. The highest second high impacts were evaluated for the SO₂ short-term PSD Full Impact Analyses. The highest sixth high impacts were evaluated for short-term PM₁₀ analyses, per EPA’s Pre-1997 PM₁₀ Method. The highest annual concentrations were evaluated for the long-term analyses for each pollutant.

If the modeling results predicted an exceedance of a standard, the receptor-averaging period for each predicted exceedance was compared to the significant receptor file created in the Preliminary Analysis to evaluate whether the Valero Refinery was predicted to be significant for the receptor averaging period combination at which the exceedance was predicted. If the predicted concentrations for the Valero Refinery were not significant for a receptor averaging period combination when an exceedance was predicted, the Valero Refinery was not considered to be contributing to the exceedance. The reported concentration was then identified using the significant receptor-averaging period combination with the highest predicted concentrations in the full analysis.

Air Quality Monitoring Data

The preliminary modeling conducted as part of this analysis resulted in predicted concentrations that were above the modeling significance levels for NO₂ (annual), PM₁₀ (24-hour and annual), and SO₂ (3-hour and 24-hour) averaging periods. Background concentration data was obtained from the ODEQ, Air Quality Division for NO₂, PM₁₀, and SO₂ for each of the applicable averaging periods. Since pre-construction monitoring is not possible for a retroactive PSD permit and pre-construction monitoring would only delay installation of control equipment, Air Quality allowed the use of monitoring data collected from the Ponca City Area. Ponca City and Ardmore are of a similar size and have similar source impacts. The monitoring data should provide conservative background data for the NAAQS analysis and are shown below. Post-construction monitoring will be required in the permit for those pollutants that exceeded the monitoring exemption levels. The background concentrations were added to the modeled results to demonstrate compliance with the NAAQS and increment consumption.

Summary of Background Concentrations

Pollutant	Averaging Period	Monitored Concentration (µg/m³)
NO ₂	Annual	13.2
PM ₁₀	24-hour	72.0
	Annual	24.0
SO ₂	3-hour	140.4
	24-hour	62.6

PSD NAAQS Full Impact Analyses

This section provides the results of the PSD NAAQS Analyses. A discussion of each of the pollutants included in the analysis (NO₂, SO₂, and PM₁₀) is provided.

NO₂ NAAQS Analysis

A summary of the annual NO₂ NAAQS modeling analysis is provided below.

NO₂ NAAQS Analysis Results

Averaging Period	NAAQS (µg/m³)	Background (µg/m³)	Max. Predicted Concentration (µg/m³)	Predicted Conc. & Background (µg/m³)
Annual	100	13.2	27.9	41.1

The highest predicted ambient concentration plus background was less than the NAAQS. Thus, no further analysis was required for the NO₂ NAAQS.

PM₁₀ NAAQS Analysis

A summary of the 24-hour and annual PM₁₀ NAAQS modeling analyses is provided below.

PM₁₀ NAAQS Analysis Results

Averaging Period	NAAQS (µg/m³)	Background (µg/m³)	Max. Predicted Concentration (µg/m³)	Predicted Conc. & Background (µg/m³)
24-hour	150	72	62.7	134.7
Annual	50	24	9.1	33.1

1) 24-Hour Analysis

The highest predicted ambient concentration plus background was less than the NAAQS. Thus, no further analysis was required for the 24-Hour PM₁₀ NAAQS.

2) Annual Analysis

The highest predicted ambient concentration plus background was less than the NAAQS. Thus, no further analysis was required for the annual PM₁₀ NAAQS.

SO₂ NAAQS Analysis

A summary of the 3-hour and 24-hour SO₂ NAAQS modeling analyses is provided below.

SO₂ NAAQS Analysis Results

Averaging Period	NAAQS (µg/m³)	Background (µg/m³)	Max. Predicted Concentration (µg/m³)	Predicted Conc. & Background (µg/m³)
3-hour	1,300	140.4	567.9	708.3
24-hour	365	62.6	99.6	162.2

1) Three-Hour Analysis

The highest predicted ambient concentration plus background was less than the NAAQS. Thus, no further analysis was required for the three-hour NAAQS.

2) 24-Hour Analysis

The highest predicted ambient concentration plus background was less than the NAAQS. Thus, no further analysis was required for the 24-hour NAAQS.

PSD Increment Analysis

This section provides the results of the PSD Increment Analysis. The following sections discuss in more detail the methodology and results for each of the pollutants included in the analysis.

NO₂ PSD Increment Analysis

A summary of the annual NO₂ PSD Increment Analysis is provided below.

NO₂ Increment Analysis Results

Averaging Period	Maximum Predicted Conc. (µg/m³)	PSD Increment (µg/m³)
Annual	22.7	25

The highest predicted ambient concentration plus background was less than the PSD increment. Thus, no further analysis was required for the annual NO₂ PSD increment.

PM₁₀ PSD Increment Analysis

A summary of the 24-hour and annual PM₁₀ PSD increment modeling analyses is provided below.

PM₁₀ Increment Analysis Results

Averaging Period	Maximum Predicted Conc. (µg/m³)	PSD Increment (µg/m³)
24-hour	26.2	30
Annual	5.1	17

1) 24-Hour Analysis

The highest predicted ambient concentration plus background was less than the PSD increment. Thus, no further analysis was required for the 24-hour PM₁₀ PSD increment.

2) Annual Analysis

The highest predicted ambient concentration plus background was less than the PSD increment. Thus, no further analysis was required for the annual PM₁₀ PSD increment.

SO₂ PSD Increment Analysis

A summary of the 3-hour and 24-hour SO₂ PSD increment modeling analyses is provided below.

SO₂ Increment Analysis Results

Averaging Period	Maximum Predicted Conc. (µg/m³)	PSD Increment (µg/m³)
3-hour	142.8	512
24-hour	60.0	91

1) Three-Hour Analysis

The highest predicted three-hour ambient concentration plus background was less than the PSD increment. Thus, no further analysis was required for the three-hour SO₂ PSD increment.

2) 24-Hour Analysis

The highest predicted 24-hour ambient concentration plus background was less than the PSD increment. Thus, no further analysis was required for the 24-hour SO₂ PSD increment.

Summary of Modeling Results

Pollutant	Analysis	Averaging Period	Standard (µg/m³)	Ambient Impact (µg/m³)¹
NO ₂	NAAQS	Annual	100	41.1
	Increment	Annual	25	22.7
PM ₁₀	NAAQS	24-hour	150	134.7
	NAAQS	Annual	50	33.1
	Increment	24-hour	30	26.2
	Increment	Annual	17	5.1
SO ₂	NAAQS	3-hour	1300	708.3
	NAAQS	24-hour	365	162.2
	Increment	3-hour	512	142.8
	Increment	24-hour	91	60.0

¹ - Ambient Impacts include background concentrations.

F. Evaluation of Source-Related Impacts on Growth, Soils, Vegetation, & Visibility**Mobile Sources**

Current EPA policy is to require an emissions analysis to include mobile sources. In this case, mobile source emissions are expected to be negligible. The number of employees needed beyond those currently employed is insignificant.

Growth Impacts

The purpose of the growth impact analysis is to quantify the possible net growth of the population of the area as a direct result of the project. This growth can be measured by the increase in residents of the area, the additional use and need of commercial and industrial facilities to assist the additional population with everyday services, and other growth, such as additional sewage treatment discharges or motor vehicle emissions.

Approximately 50 trade jobs (i.e., welders, electricians, construction workers, etc.) over a 24 month period will be needed to complete the construction of the project. It is anticipated that the majority of these jobs will be local hires, thus not requiring any additional residential or commercial capacity within the area. No full-time positions are expected. There should be no increase in community growth or the need for additional infrastructure. Therefore, it is not anticipated that the project will result in an increase in secondary emissions associated with non-project related activities or growth.

Ambient Air Quality Impact Analysis

The purpose of this aspect of impact analysis is to predict the air quality in the area of the project during construction and after commencing operation. This analysis follows the growth analysis by combining the associated growth with the emissions from the proposed project and the emissions from other permitted sources in the area to predict the estimated total ground-level concentrations of pollutants as a result of the project, including construction.

The only source of additional emissions may be from fugitive dust generated from equipment transportation or vehicles during construction. Any long-term air quality impact in the area will result from emissions increases due to operation of the facility. These impacts have been analyzed in preceding sections.

Soils and Vegetation Impact

The primary soil units in the area of the Refinery are Amber very fine sandy loam and Dale silt loam. The main crops typically grown on the soils identified within the area of interest are native grasses, and cultivated crops. No sensitive aspects of the soil and vegetation in this area have been identified. As such, the secondary NAAQS, which establish ambient concentration levels below which it is anticipated that no harmful effects to either soil or vegetation can be expected, are used as the benchmark for this analysis.

The effects of gaseous air pollutants on vegetation may be classified into three rather broad categories: acute, chronic, and long-term. Acute effects are those that result from relatively short (less than 1 month) exposures to high concentrations of pollutants. Chronic effects occur when organisms are exposed for months or even years to certain threshold levels of pollutants. Long-term effects include abnormal changes in ecosystems and subtle physiological alterations in organisms. Acute and chronic effects are caused by the gaseous pollutant acting directly on the organism, whereas long-term effects may be indirectly caused by secondary agents such as changes in soil pH.

SO₂ enters the plant primarily through the leaf stomata and passes into the intercellular spaces of the mesophyll, where it is absorbed on the moist cell walls and combined with water to form sulfurous acid and sulfite salts. Plant species show a considerable range of sensitivity to SO₂. This range is the result of complex interactions among microclimatic (temperature, humidity, light, etc.), edaphic, phenological, morphological, and genetic factors that influence plant response (USEPA, 1973).

NO₂ may affect vegetation either by direct contact of NO₂ with the leaf surface or by solution in water drops, becoming nitric acid. Acute and chronic threshold injury levels for NO₂ are much higher than those for SO₂ (USEPA, 1971).

The secondary NAAQS are intended to protect the public welfare from adverse effects of airborne effluents. This protection extends to agricultural soil. The modeling conducted, which demonstrated compliance with the Primary NAAQS simultaneously demonstrated compliance with the Secondary NAAQS because the Secondary NAAQS are higher or equal to the Primary NAAQS. Since the secondary NAAQS protect impact on human welfare, no significant adverse impact on soil and vegetation is anticipated.

Visibility Impairment

Visibility is affected primarily by PM and NO_x emissions. The area near the facility is primarily agricultural, consisting of pastureland. Some residences are located southeast and east of the facility. The closest airport is located approximately 3 miles north-northeast of the facility. Therefore, there are no airports, scenic vistas, or other areas that would be affected by minor reductions in visibility. The project is not expected to produce any perceptible visibility impacts in the vicinity of the plant. The project is actually expected to reduce visibility impacts of the existing facility. EPA computer software for visibility impacts analyses, intended to predict distant impacts, terminates prematurely when attempts are made to determine close-in impacts. It is concluded that there will be minimal impairment of visibility resulting from the facility's emissions. Given the limitation of 20% opacity of emissions, and a reasonable expectation that normal operation will result in 0% opacity, no local visibility impairment is anticipated.

G. Class I Area Impact Analysis

A further requirement of PSD includes the special protection of air quality and air quality related values (AQRV) at potentially affected nearby Class I areas. Assessment of the potential impact to visibility (regional haze analysis) is required if the source is located within 100 km of a Class I area. The Refinery is not within 100 km of the nearest Class I area, which is the Wichita Mountains Natural Wildlife Refuge (WMNWR). The Refinery is approximately 143 km from the WMNWR. Therefore, the Refinery was not evaluated for its impacts on the WMNWR.

SECTION VII. OKLAHOMA AIR POLLUTION CONTROL RULES

OAC 252:100-1 (General Provisions) [Applicable]

Subchapter 1 includes definitions but there are no regulatory requirements.

OAC 252:100-3 (Air Quality Standards and Increments) [Applicable]

Primary Standards are in Appendix E and Secondary Standards are in Appendix F of the Air Pollution Control Rules. At this time, all of Oklahoma is in attainment of these standards.

OAC 252:100-4 (New Source Performance Standards) [Applicable]

Federal regulations in 40 CFR Part 60 are incorporated by reference as they exist on July 1, 2002, except for the following: Subpart A (Sections 60.4, 60.9, 60.10, and 60.16), Subpart B, Subpart C, Subpart Ca, Subpart Cb, Subpart Cc, Subpart Cd, Subpart Ce, Subpart AAA, and Appendix G. These requirements are addressed in the "Federal Regulations" section.

OAC 252:100-5 (Registration of Air Contaminant Sources) [Applicable]

Subchapter 5 requires sources of air contaminants to register with Air Quality, file emission inventories annually, and pay annual operating fees based upon total annual emissions of regulated pollutants. Emission inventories have been submitted and fees paid for the past years.

OAC 252:100-8 (Permits for Part 70 Sources) [Applicable]

Part 5 includes the general administrative requirements for part 70 permits. Any planned changes in the operation of the facility which result in emissions not authorized in the permit and which exceed the “Insignificant Activities” or “Trivial Activities” thresholds require prior notification to AQD and may require a permit modification. Insignificant activities mean individual EU that either are on the list in Appendix I (OAC 252:100) or whose actual calendar year emissions do not exceed the following limits:

- 5 TPY of any one criteria pollutant
- 2 TPY of any one hazardous air pollutant (HAP) or 5 TPY of multiple HAPs or 20% of any threshold less than 10 TPY for single HAP that the EPA may establish by rule
- 0.6 TPY of any one Category A toxic substance
- 1.2 TPY of any one Category B toxic substance
- 6.0 TPY of any one Category C toxic substance

Emission and operating limitations have been established based on information in the permit application. If any specific conditions of any previous permit are in conflict with this permit, the specific conditions of this permit will supercede the specific conditions of the previously issued permit.

OAC 252:100-9 (Excess Emission Reporting Requirements) [Applicable]

In the event of any release which results in excess emissions, the owner or operator of such facility shall notify the Air Quality Division as soon as the owner or operator of the facility has knowledge of such emissions, but no later than 4:30 p.m. the next working day. Within ten (10) working days after the immediate notice is given, the owner operator shall submit a written report describing the extent of the excess emissions and response actions taken by the facility. Part 70/Title V sources must report any exceedance that poses an imminent and substantial danger to public health, safety, or the environment as soon as is practicable. Under no circumstances shall notification be more than 24 hours after the exceedance.

OAC 252:100-13 (Prohibition of Open Burning) [Applicable]

Open burning of refuse and other combustible material is prohibited except as authorized in the specific examples and under the conditions listed in this subchapter.

OAC 252:100-17 (Incinerators) [Not Applicable]

This subchapter specifies design and operating requirements and emission limitations for incinerators, municipal waste combustors, and hospital, medical, and infectious waste incinerators. Thermal oxidizers, flares, and any other air pollution control devices are exempt from this subchapter. The refinery does not have any incinerators besides the control devices used at the refinery.

OAC 252:100-19 (Particulate Matter)

[Applicable]

This subchapter specifies a PM emission limitation of 0.6 lb/MMBTU from fuel-burning units with a rated heat input of 10 MMBTUH or less. All of the small (<10 MMBTUH) fuel-burning units are fired with refinery fuel-gas or low-sulfur diesel fuel.

Fuel-burning equipment with a rated heat input between 10 and 1,000 MMBTUH are limited to between 0.599 and 0.20 lb/MMBTU as defined in Appendix C. The following table lists all fuel-burning equipment greater than 10 MMBTUH affected by this permit and their associated emission limits.

EU	Type of Unit	MMBTUH	SC 19 Limit (lb/MMBTU)
H-210001	Process Heater	12.0	0.576
H-100024	Asphalt Tank Heater	13.5	0.560
H-402A	Process Heater	13.9	0.558
H-401B	Process Heater	14.8	0.548
H-402B	Process Heater	15.8	0.540
H-401A	Process Heater	16.0	0.538
H-411	Process Heater	21.7	0.501
H-407	Process Heater	25.0	0.484
H-406	Process Heater	28.0	0.471
H-404	Process Heater	48.5	0.413
H-405	Process Heater	50.8	0.409
H-6502	Process Heater	54.3	0.402
B-803	Boiler	86.8	0.360
B-802	Boiler	89.8	0.357
B-252	CO Boiler (Existing)	92.0	0.355
H-6501	Process Heater	92.1	0.355
H-403	Process Heater	98.7	0.349
H-201	Process Heater	116.7	0.335
H-603	Process Heater	125.5	0.329
B-253	CO Boiler (New)	125.8	0.329
H-102B	Process Heater	135.0	0.324
B-254	Boiler/CO Boiler	144.0	0.319
H-102A	Process Heater	160.0	0.311
H-15001	Process Heater	326.8	0.262

AP-42 (9/98), Chapter 1.3, Table 1.3-2, lists the total PM emissions for distillate fuel oil to be 1.3 lb/10³ gallons or about 0.0093 lb/MMBTU. AP-42 (7/98), Section 1.4, Table 1.4-2, lists the total PM emissions for natural gas to be 7.6 lb/MMft³ or about 0.0076 lb/MMBTU. AP-42 (10/96), Section 3.3, Table 3.3-1, lists the total PM emissions from diesel-fired internal combustion engines less than 600-hp to be 0.31 lb/MMBTU. AP-42 (10/96), Section 3.4, Table 3.4-1, lists the total PM emissions from diesel-fired internal combustion engines greater than 600-hp to be 0.1 lb/MMBTU. The permit requires the use of refinery fuel gas or distillate fuel oil to ensure compliance with Subchapter 19. Since all of the emission limits under Subchapter

19 are greater than the expected emissions from these units, having the permit require these units to only be fueled with refinery fuel gas or distillate fuel oil will ensure compliance with Subchapter 19.

Fuel-burning unit is defined as “any internal combustion engine or gas turbine or any other combustion device used to convert the combustion of fuel into usable energy.” Since flares and incinerators are pollution control devices designed to destroy pollutants and are not used to convert fuel into usable energy, they do not meet the definition of fuel-burning unit and are not subject to these requirements. Also, since the FCCU regenerators and the CCR do not convert combustion of fuel into usable energy, except for the CO boiler, they are not considered fuel-burning units.

This subchapter also limits emissions of PM from directly fired fuel-burning units and industrial processes based on their process weight rates. For process rates up to 60,000 lb/hr (30 TPH), the emission rate in pounds per hour (E) is not to exceed the rate calculated using the process weight rate in tons per hour (P) and the formula in appendix G ($E = 4.10 \cdot P^{(0.67)}$). For process rates greater than 60,000 lb/hr (30 TPH), the emission rate in pounds per hour (E) is not to exceed the rate calculated using the process weight rate in tons per hour (P) and the formula in appendix G ($E = 55.0 \cdot P^{(0.11)} - 40$). Listed in the following table are the process weight rates for the EUs affected by this permit, the estimated emissions, and the allowable emission limits. Emission limits established by Subchapter 19 include the front-half and back-half of the PM sampling train. Therefore, representative emissions from these emission units include the anticipated emissions from both the front-half and the back-half of the sampling train and are greater than the limits that will be established in the permit.

EU	Source	Rate (TPH)	SC 19 Limit (lb/hr)	Emissions (lb/hr)
HI-801	Asphalt Blowstill & TO	10.64	19.99	0.69
FGS-200	FCCU Regenerators*	1,443	82.43	51.34
cat_hop	FCCU Catalyst Hopper Vent	700	73.06	3.77
HI-501	SRU Incinerator	5.45	15.40	0.43
CCR	Platformer CCR Vent	0.35	2.03	0.39

* - Based only on the catalyst recirculation rate.

The asphalt blowstill incinerator only combusts waste gases and no specific requirements are needed to ensure compliance with this subchapter. The FCCU Regenerators and Catalyst Hopper will be vented to a WS. The permittee will be required to monitor and record the WS operating parameters as shown in the BACT analysis. PM emissions from the Platformer CCR are also controlled using a series of internal screens and cyclones. Since the catalyst is so expensive, every effort is made to recover it and minimize air emissions. There are currently no indirect operating parameters that can be measured to ensure operation of the screens and cyclones.

OAC 252:100-25 (Visible Emissions and Particulate Matter) [Applicable]

No discharge of greater than 20% opacity is allowed except for short-term occurrences which consist of not more than one six-minute period in any consecutive 60 minutes, not to exceed three such periods in any consecutive 24 hours. In no case, shall the average of any six-minute period exceed 60% opacity. EUs subject to an opacity limit under NSPS are exempt from the requirements of this subchapter. When burning refinery fuel-gas in the combustion units (process heaters and boilers) there is little possibility of exceeding the opacity standards. The FCCU is subject to an opacity limit under NSPS, Subpart J. The Asphalt Blowstill is subject to this subchapter. For the blowstill and diesel-fired engines (except for small engines used only during emergencies), the permit will require a daily observation of each stack and opacity readings to be conducted if visible emissions are detected.

OAC 252:100-29 (Fugitive Dust) [Applicable]

No person shall cause or permit the discharge of any visible fugitive dust emissions beyond the property line on which the emissions originate in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or interfere with the maintenance of air quality standards. Under normal operating conditions, this facility will not cause a problem in this area, therefore it is not necessary to require specific precautions to be taken.

OAC 252:100-31 (Sulfur Compounds) [Applicable]

Part 2 limits the ambient air impact of SO₂ emissions from any one existing source or any one new petroleum and natural gas process source subject to OAC 252:100-31-26(a)(1). This part also limits the impact of hydrogen sulfide (H₂S) emissions from any new or existing source. Emissions from all of the equipment have been modeled using ISCST3 and have been shown to be in compliance with these standards as shown in the following tables.

Ambient Impacts of SO₂ (Preliminary Analysis)

Averaging Time	Standard µg/m³	Impact µg/m³
5-Minute*	1,300	153
1-hour*	1,200	93
3-hour	650	84
24-hour	130	10
Annual	80	8

* - Based on the PSD modeling preliminary analysis and adjustment factors for different averaging periods.

Ambient Impacts of H₂S (TV Application)

Averaging Time	Standard µg/m³	Impact µg/m³
24-hour	278	22

Part 5 limits SO₂ emissions from new fuel-burning equipment (constructed after July 1, 1972). For gaseous fuels the limit is 0.2 lb/MMBTU heat input. This is equivalent to approximately 0.2 weight percent sulfur in the fuel gas which is equivalent to 2,000 ppm sulfur. All fuel-burning equipment constructed or modified after June 11, 1973, which combust refinery fuel gas are subject to NSPS, Subpart J, which limits the amount of H₂S in the fuel gas to 0.1 grains/DSCF or approximately 160 ppm. The refinery fuel gas has a HHV of approximately 800 BTU/SCF, which is equivalent to approximately 0.0357 lb/MMBTU. Other refinery fuel gas combustion devices, built prior to June 11, 1973, also utilize the same fuel and will be in compliance with the gaseous fuel limit of 0.2 lb/MMBTU.

For liquid fuels the limit is 0.8 lb/MMBTU. All liquid fuels combusted at the facility are low-sulfur fuel oil with a maximum sulfur content of 0.05 percent. AP-42 (9/98), Chapter 1.3, Table 1.3-1, gives an emission factor of 142*S pound of SO₂ per 1,000 gallons which is approximately 0.05 lb/MMBTU when S = 0.05% by weight sulfur in the fuel oil. This emission rate is in compliance with the limitation of 0.8 lb/MMBTU. The permit will require the use of refinery fuel gas with a limit of 160 ppm or fuel oil with a maximum sulfur content of 0.05 % sulfur by weight.

Part 5 also requires new fuel-burning equipment with a heat input greater than 250 MMBTUH to meet other continuous monitoring requirements. There is only one heater (H-15001) that is rated greater than 250 MMTBUH (327 MMBTUH). However, this heater is fired with refinery fuel gas with a maximum H₂S content of 160 ppm, which exempts it from these requirements.

Part 5 requires removal or oxidation of H₂S from the exhaust gas of any new petroleum or natural gas process equipment. Oxidation of the H₂S must be conducted in a system that assures at least a 95% reduction of the H₂S in the exhaust gases and that is equipped with an alarm system to signal non-combustion of the exhaust gases. This does not apply to emission units that emit less than 0.3 lb/hr of H₂S. Emissions from the existing liquid sulfur storage pit and the regenerated amine storage tank are estimated below the exemption level. The potential emissions from railcar loading operations (approximately 0.58 lb/hr/railcar based on the maximum loading rate) exceed the exemption level. However, actual emissions from loading operations are less than the exemption level. Loading operations will be required to test emissions from the loading rack during loading to determine the emissions on a lb/hr basis to determine whether or not they exceed the exemption level and are required to be flared. If testing determines that emissions exceed the exemption level, the permit will require the loading rack operation to be flared in accordance with this rule. For facilities with an SRU prior to release, Subchapter 31 requires the SRU to meet a calculated sulfur reduction efficiency based on the SRU capacity. The existing SRU has a capacity of approximately 119 LTD. The required sulfur dioxide reduction efficiency for units with a capacity greater than 5 LTD but less than 150 LTD is calculated using the following formula: $Z = 92.34 \times (X^{0.00774})$, where X is the sulfur feed rate in LTD. Based on this formula and the capacity of the existing SRU, the required sulfur reduction efficiency is 95.8%. The SRU reduction efficiency is expected to exceed 98%. All applicable requirements will be incorporated into the permit.

OAC 252:100-33 (Nitrogen Oxides)

[Not Applicable]

NO_x emissions are limited to 0.20 lb/MMBTU from all gas-fired fuel-burning equipment constructed after February 2, 1972, with a rated heat input of 50 MMBTUH or greater. All of the equipment rated greater than 50 MMBTUH and their applicability are listed in the table below.

EU	Name	Rating MMBTUH	Emissions (lb/hr)	Emissions (lb/MMBTU)
H-405	Process Heater	50.8	4.98	0.098
H-6502	Process Heater	54.3	3.26	0.060
B-803	Boiler	86.8	8.51	0.098
B-802	Boiler	89.8	8.80	0.098
H-6501	Process Heater	92.1	5.53	0.060
H-403	Process Heater	98.7	9.68	0.098
H-201	Process Heater	116.7	21.74	0.186
H-603	Process Heater	125.5	8.28	0.066
B-253	CO Boiler (New)	125.8	3.77	0.030
H-102B	Process Heater	135.0	7.97	0.059
B-254	Boiler/CO Boiler	144.0	8.64	0.060
H-102A	Process Heater	160.0	7.20	0.045
H-15001	Process Heater	326.8	12.09	0.037

Heaters H-6501, H-6502, H-603, H-102A, H-102B, and H-15001 and the CO Boilers are equipped with LNB or ULNB. All emissions from the heaters and CO Boilers are in compliance with this subchapter. The FCCU regenerators, CCR, and incinerators do not meet the definition of fuel-burning equipment and are not subject to this subchapter.

OAC 252:100-35 (Carbon Monoxide)

[Applicable]

Subchapter 35 requires new petroleum catalytic cracking and petroleum reforming units to reduce CO emissions by use of complete secondary combustion of the waste gas generated. Removal of 93 percent or more of the carbon monoxide generated is considered equivalent to secondary combustion. The FCCU Regenerators are subject to this subchapter. The FCCU No. 1 Regenerator reduces CO emissions by secondary combustion in the existing CO Boiler and Incinerator or in the new CO Boiler. The FCCU No. 2 Regenerator is a full combustion unit with CO emissions at or near the detection limit. The FCCU No. 2 Regenerator combust the remaining coke from the catalyst that was not combusted in the FCCU No. 1 Regenerator. While this rule is not specific about compliance with the alternative standard for OAC 252:100-35, the intent of the regulation is to reduce emissions of CO to a level which is represented by complete combustion. Complete combustion of CO can be shown in other ways such as through operational parameters and exhaust gas CO concentrations. Based on average combustion processes, CO emissions from combustion units that are operating properly average 500 ppmv and range from 1,000 to 50 ppmv. Operation of the FCCU No. 2 Regeneration unit in full combustion mode and with the established NSPS, Subpart J CO limit of 500 ppmv in the exhaust gases of the FCCU should assure compliance with the intent of Subchapter 35 (complete combustion). The Platformer CCR is considered a petroleum catalytic reforming unit and is also

subject to this subchapter. Compliance with a CO limit of 100 ppmv in the exhaust gases from the regenerator should assure compliance with the intent of Subchapter 35. The modified permit will also include a requirement to determine the CO concentration in the exhaust gases from the Platformer Catalyst Regenerator quarterly to show compliance with the new emission limitation.

OAC 252:100-37 (Volatile Organic Compounds)

[Applicable]

Part 1 requires all vapor-loss control devices, packing glands, and mechanical seals required by this subchapter to be properly installed, maintained, and operated.

Part 3 requires storage tanks constructed after December 28, 1974, with a capacity of 400 gallons or more and storing a VOC with a vapor pressure greater than 1.5 psia to be equipped with a permanent submerged fill pipe or with an organic vapor recovery system. Part 3 also requires storage tanks constructed after December 28, 1974, with a capacity of more than 40,000 gallons and storing a VOC with a vapor pressure greater than 1.5 psia to be equipped with either an external floating roof, a fixed roof with an internal floating cover, a vapor recovery system, or other equally effective control methods approved by the DEQ. Tanks subject to the equipment standards of NSPS, Subparts K, Ka, or Kb are exempt from these requirements. Tanks T-1018, T-1019, T-1115, and V-523 were constructed prior to the applicability date of this subchapter. Tanks T-153 and T-83001 do not store VOC with a vapor pressure greater than 1.5 psia under actual storage conditions. Tanks T-1130 and T-155 are subject to the equipment requirements of NSPS, Subparts Ka and Kb, respectively. Therefore, all of the tanks are not subject to this subchapter.

Part 3 applies to VOC loading facilities constructed after December 24, 1974. Facilities with a throughput greater than 40,000 gallons/day are required to be equipped with a vapor-collection and disposal system unless all loading is accomplished by bottom loading with the hatches of the tank truck or trailer closed. Loading facilities subject to the requirements of NSPS, Subpart XX or NESHAP, Subpart R are exempt from these requirements. The light products loading terminal at the refinery is equipped with a vapor-collection and disposal system and the VOC railcar loading terminal will be equipped with a vapor-collection and disposal system. These terminals are also subject to NESHAP, Subpart R and are exempt from these requirements.

Part 5 limits the VOC content of coatings used in coating operations or lines. This facility does not normally conduct coating or painting operations except for routine maintenance of the facility and equipment, which is exempt.

Part 7 requires all VOC gases from a vapor recovery blowdown system to be burned by a smokeless flare or equally effective control device unless it is inconsistent with the "Minimum Federal Safety Standards for the Transportation of Natural and Other Gas by Pipeline" or any State of Oklahoma regulatory agency. This facility flares all emissions that are not processed by a vapor recovery system.

Part 7 requires fuel-burning and refuse-burning equipment to be operated and maintained so as to minimize emissions of VOCs. Temperature and available air must be sufficient to provide essentially complete combustion. All equipment at the refinery is operated to minimize emissions of VOC.

Part 7 also requires all reciprocating pumps and compressors handling VOCs to be equipped with packing glands that are properly installed and maintained in good working order and rotating pumps and compressors handling VOCs to be equipped with mechanical seals. Equipment subject to NSPS, Subpart VV and/or Subpart GGG are exempt from these requirements. The equipment affected by this permit at the refinery is subject to the requirements of NSPS, Subpart GGG.

OAC 252:100-41 (Hazardous Air Pollutants and Toxic Air Contaminants) [Applicable]
Part 3 addresses hazardous air contaminants. NESHAP, as found in 40 CFR Part 61, are adopted by reference as they exist on July 31, 2002, with the exception of Subparts B, H, I, K, Q, R, T, W and Appendices D and E, all of which address radionuclides. In addition, General Provisions as found in 40 CFR Part 63, Subpart A, and the Maximum Achievable Control Technology (MACT) standards as found in 40 CFR Part 63, Subparts F, G, H, I, J, L, M, N, O, Q, R, S, T, U, W, X, Y, AA, BB, CC, DD, EE, GG, HH, II, JJ, LL, KK, MM, OO, PP, QQ, RR, SS, TT, UU, VV, WW, XX, YY, CCC, DDD, EEE, GGG, HHH, III, JJJ, LLL, MMM, NNN, OOO, PPP, QQQ, RRR, TTT, UUU, VVV, XXX, CCCC, GGGG, HHHH, NNNN, SSSS, TTTT, UUUU, VVVV, and XXXX are hereby adopted by reference as they exist on July 31, 2002. These standards apply to both existing and new sources of HAPs. These requirements are covered in the "Federal Regulations" section.

Part 5 is a **state-only** requirement governing toxic air contaminants. New sources (constructed after March 9, 1987) emitting any category "A" pollutant above de minimis levels must perform a BACT analysis, and if necessary, install BACT. All sources are required to demonstrate that emissions of any toxic air contaminant that exceeds the de minimis level do not cause or contribute to a violation of the MAAC.

Emissions of silica from the FCCU catalyst were estimated and modeled to determine compliance with the MAAC for silica. Emissions from the FCCU were modeled using ISC3P. Based on the maximum concentration of silica (25% - CAS # 7631-86-9) in the catalyst (and assuming all PM₁₀ emissions from the FCCU Regenerators is catalyst, the highest 24-hour impact was determined to be 7 µg/m³ compared to a MAAC of 20 µg/m³. The internal combustion engines, boilers, and heaters will have emissions of air toxics, the most significant being formaldehyde, a Category A air toxic with de minimis levels of 0.57 lb/hr, and 0.6 TPY and a MAAC of 12 µg/m³, 24-hour basis. Based on toxics modeling of this facility using ISCST3 this facility will comply with all applicable MAACs.

OAC 252:100-43 (Testing, Monitoring, and Recordkeeping) [Applicable]
This subchapter provides general requirements for testing, monitoring and recordkeeping and applies to any testing, monitoring or recordkeeping activity conducted at any stationary source. To determine compliance with emissions limitations or standards, the Air Quality Director may require the owner or operator of any source in the state of Oklahoma to install, maintain and operate monitoring equipment or to conduct tests, including stack tests, of the air contaminant source. All required testing must be conducted by methods approved by the Air Quality Director and under the direction of qualified personnel. A notice-of-intent to test and a testing protocol shall be submitted to Air Quality at least 30 days prior to any EPA Reference Method stack tests. Emissions and other data required to demonstrate compliance with any federal or state emission limit or standard, or any requirement set forth in a valid permit shall be recorded, maintained, and submitted as required by this subchapter, an applicable rule, or permit requirement. Data from any required testing or monitoring not conducted in accordance with the provisions of this subchapter shall be considered invalid. Nothing shall preclude the use, including the exclusive use, of any credible evidence or information relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

The following Oklahoma Air Quality Rules are not applicable to this facility:

OAC 252:100-7	Permit for Minor Facilities	not in source category
OAC 252:100-11	Alternative Emissions Reduction	not requested
OAC 252:100-15	Mobile Sources	not in source category
OAC 252:100-17	Incinerators	not type of emission unit
OAC 252:100-23	Cotton Gins	not type of emission unit
OAC 252:100-24	Grain Elevators	not in source category
OAC 252:100-39	Nonattainment Areas	not in area category
OAC 252:100-47	Existing Municipal Solid Waste Landfills	not in source category

SECTION VIII. FEDERAL REGULATIONS

PSD, 40 CFR Part 52

[Applicable]

Total potential emissions for NO_x, CO, VOCs, SO₂, and PM₁₀ are greater than the level of significance of 250 TPY. Modifications of the facility exceeded the significance levels as discussed in the “Emissions” section. The PSD requirements for these modifications are addressed in the “PSD Review” section. Any future increases of emissions must be evaluated for PSD if they exceed a significance level. Emissions increases from new boiler/CO boiler project, the railcar loading station project, and the modification of the existing SRU emission limits are below the applicable significance levels.

NSPS, 40 CFR Part 60

[Subparts Db, Dc, J, Kb, GGG, and QQQ are Applicable]

Subparts D and Da, Fossil Fired Steam Generators. These subparts affect any fossil-fuel-fired steam generating unit with a heat input rate of 250 MMBTUH. Only one EU affected by this permit exceeds 250 MMBUTH and it is not used to generate steam.

EU	Description	MMBTUH	Const. Date
H-15001	Process Heater	326.8	1992

Subpart Db, Industrial-Commercial-Institutional Steam Generating Units. This subpart affects steam generating units with a heat input capacity greater than 100 MMBTUH and that commenced construction, modification, or reconstruction after June 19, 1984. All of the units greater than 100 MMBTUH affected by this permit meet the definition of process heaters and are not affected units. Process heater means a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst. Except for the new CO Boiler, the EU listed below either heat the crude oil entering the refinery or heat the FCCU feedstock. Both the new CO boiler and boiler/CO boiler are subject to this subpart.

EU	Description	MMBTUH	Const. Date
H-102A	Process Heater	160.0	Mod. 1990
H-102B	Process Heater	135.0	Mod. 1990
H-603	Process Heater	125.5	1992

EU	Description	MMBTUH	Const. Date
B-253	CO boiler (New)	125.8	2003-4
B-254	Boiler/CO Boiler (New)	144.0	2004-5
H-201	Process Heater	116.7	1974

Subpart Dc, Small Industrial-Commercial-Institutional Steam Generating Units. This subpart affects steam generating units with a heat input capacity between 10 and 100 MMBTUH and that commences construction, modification, or reconstruction after June 9, 1989. Process heaters are not affected units. Process heater means a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst. EU H-403, H-404, H-405, H-406, H-401A, H-401B, H-402A, H-402B, H-407, H-411, H-6501 and H-6502 all heat a material to initiate or promote a chemical reaction of which the heated material participates as a reactant. The remaining EU are considered steam generating units. Steam generating unit means a device that combusts any fuel and produces steam or heats water or any other heat transfer medium. EU H-100024 and H-210001 heat oil, which is then used to transfer heat to other materials, and are subject to this subpart. EU B-252 produces steam from the combustion of refinery fuel gas and the FCCU Regenerator No. 1 off-gases. EU B-802, B-803, and B-252 were constructed prior to the applicability date of this subpart.

EU	Description	MMBTUH	Const. Date
H-210001	Process Heater	12.0	1996
H-100024	Asphalt Tank Heater	13.5	1999
H-402A	Process Heater	13.9	< 1968
H-401B	Process Heater	14.8	1974
H-402B	Process Heater	15.8	< 1968
H-401A	Process Heater	16.0	< 1968
H-411	Process Heater	21.7	1985
H-407	Process Heater	25.0	1974
H-406	Process Heater	28.0	1974
H-404	Process Heater	48.5	Mod. 1995
H-405	Process Heater	50.8	Mod. 1995
H-6502	Process Heater	54.3	1992
B-803	Boiler	86.8	1975
B-802	Boiler	89.8	1975
B-252	CO Boiler	92.0	1984
H-6501	Process Heater	92.1	1992
H-403	Process Heater	98.7	1975

Heaters H-210001 and H-100024 and the existing CO boiler are subject to the fuel recordkeeping requirement of this subpart since they do not combust coal, wood, oil and/or a mixture of these fuels. Heaters H-210001 and H-100024 only combust refinery fuel-gas and the existing CO boiler combusts refinery fuel-gas and off-gases from the FCCU No. 1 Regenerator. Per 40 CFR 60.48(g) the owner/operator of each affected EU will be required to record and maintain records of the amounts of each fuel combusted during each day.

Subpart I, Hot Mix Asphalt Facilities. This facility does not manufacture hot mix asphalt by heating and drying aggregate and mixing with asphalt cements. This facility only manufactures asphalt cements.

Subpart J, Petroleum Refineries. This subpart applies to the following affected facilities in petroleum refineries: FCCU catalyst regenerators, fuel gas combustion devices, and Claus sulfur recovery plants. This permit will not address any Claus sulfur recovery plants. All fuel gas combustion devices which commence construction or modification after June 11, 1973, are subject to a fuel gas H₂S limitation of 0.10 grains of H₂S/DSCF which is required to be continuously monitored and recorded. Fuel gas does not include gases generated by catalytic cracking unit catalyst regenerators. All of the refinery fuel gas combustion devices listed below are subject to this subpart. The CO boilers are affected units but only due to the supplemental refinery fuel gas they combust. The FCCU regenerator off-gases are not fuel gas. Fuel gas combusted by the affected units must be monitored and recorded and can be done at one location. Based on 1998 monitoring data, the typical sulfur content of the refinery fuel gas used at the Valero Refinery is 0.027 grains of H₂S/DSCF. All emission limits, monitoring, and recordkeeping requirements for the refinery fuel gas combustion devices will be incorporated into the permit.

EU	Type of Unit	MMBTUH	Const. Date
Crude Unit Flare	Process Flare	N/A	1976
HI-801	Asphalt Blowstill and Thermal Oxidizer	N/A	1992
HI-81001	Platformer and Alkylation Units	N/A	1993
Light Products Loading Terminal	Gasoline Loading Rack Vapor Combustor	N/A	1996
H-210001	Process Heater	12.0	1996
H-100024	Asphalt Tank Heater	13.5	1999
H-401B	Process Heater	14.8	1974
H-411	Process Heater	21.7	1985
H-407	Process Heater	25.0	1974
H-406	Process Heater	28.0	1974
H-404	Process Heater	48.5	Mod. 1995
H-405	Process Heater	50.8	Mod. 1995
H-6502	Process Heater	54.3	1992
B-803	Boiler	86.8	1975
B-802	Boiler	89.8	1975
B-252	CO Boiler	92.0	1984
H-6501	Process Heater	92.1	1992
H-403	Process Heater	98.7	1975
H-201	Process Heater	116.7	1974
H-603	Process Heater	125.5	1992
B-253	CO Boiler	125.8	2003-4

EU	Type of Unit	MMBTUH	Const. Date
H-102B	Process Heater	135.0	Mod. 1990
H-102B	Process Heater	135.0	Mod. 1990
B-254	Boiler/CO Boiler	144.0	2004-5
H-102A	Process Heater	160.0	Mod. 1990
H-15001	Process Heater	326.8	1992

All FCCU catalyst regenerators that commence construction or modification after June 11, 1973, are subject to the following limitations:

- 1) A PM emission limitation of 1.0 lb/1,000 lbs of coke burn-off, which is required to be continuously monitored and recorded (when exhaust gases discharged from the FCCU are combusted by a waste heat boiler in which supplemental liquid or solid fuel is burned PM in excess of this limit may be emitted which shall not exceed 0.1 lb/MMBTU of heat input);
- 2) A 30% opacity limitation, except for one six-minute average opacity reading in any one hour period;
- 3) A CO emission limitation of 500 ppm by volume on a dry basis, which is required to be continuously monitored and recorded; and
- 4) One of the following SO₂ emission limitations:
 - a) For units with an add-on control device, a requirement to reduce SO₂ emissions by 90% or to maintain SO₂ emissions to less than 50 ppmv, whichever is less stringent; or
 - b) For units without an add-on control device, an SO₂ emission limitation of 9.8 lbs/1,000 lbs of coke burn-off; or
 - c) A limit of the 0.30 percent by weight or less sulfur in the FCCU fresh feed.
 Compliance with these limits must be determined based continuous monitoring and a seven day rolling average.

FCCU catalyst regenerators that commenced construction or modification prior to January 17, 1984, are exempt from the SO₂ emission limit. The FCCU was modified after 1984 and is subject to this entire subpart. The Platformer CCR is considered a catalytic reforming unit and is not subject to this subpart.

For Claus sulfur recovery plants with an oxidation control system or a reduction control system followed by incineration, Subpart J limits SO₂ emissions to 250 ppmvd at 0% excess air. The existing SRU is subject to this emission limit, continuous emission monitoring, and the recordkeeping and reporting requirements of this subpart. The permit will require the permittee to comply with all applicable requirements of the subpart.

Subpart K, Storage Vessels for Petroleum Liquids. This subpart affects storage vessels for petroleum liquids which have a storage capacity greater than 40,000 gallons but less than 65,000 gallons and which commenced construction, reconstruction, or modification after March 8, 1974, or which have a capacity greater than 65,000 gallons which commenced construction, reconstruction, or modification after June 11, 1973, and prior to May 19, 1978. The tanks below were constructed prior to the applicability of this subpart. All other tanks addressed in this permit were constructed after the applicable effective date.

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1018	P-2	External Floating	Naphtha	62,857	1953
T-1019	P-3	External Floating	Alkylate & Gasoline	66,857	1948
T-1115	P-23	External Floating	Gasoline	27,214	<1968
V-523	P-41	Cone	Amine	86	<1968

Subpart Ka, Storage Vessels for Petroleum Liquids. This subpart affects storage vessels for petroleum liquids that have a storage capacity greater than 40,000 gallons and which commenced construction, reconstruction, or modification after May 18, 1978, and prior to July 23, 1984. The only tank constructed within the applicability dates of this subpart is listed below. However, due to the overlap requirements of NESHAP, Subpart CC and since this is a Group 1 tank, this tank will only be subject to NESHAP, Subpart CC.

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-1130	P-36	External Floating	Gasoline	79,405	9/1978

Subpart Kb, VOL Storage Vessels. This subpart affects storage vessels for VOL that has a storage capacity greater than 19,813 gallons and which commenced construction, reconstruction, or modification after July 23, 1984 except for the following:

- Tanks with a capacity greater than or equal to 39,890 gallons that store a liquid with a maximum true vapor pressure less than 0.5076 psia; or
- Tanks with a capacity greater than or equal to 19,813 but less than 39,890 gallons that store a liquid with a maximum true vapor pressure less than 2.1756 psia.

The following tanks were constructed after the applicability dates of this subpart.

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-153	P-4	Fixed Roof	FCCU Charge	200,114	2001
T-83001	P-56	Cone	Sour Water	18,500	1993
T-155	P-169	External Floating	Heavy Naphtha	164,000	2003-4

Tanks T-153 and T-83001 store a liquid with a maximum true vapor pressure below the de minimis and are not subject to this subpart. Tank T-155 is subject to the equipment standards of § 60.112b (a), the testing and procedures of § 60.113b(b), the reporting and recordkeeping requirements of § 60.115b (b), and the monitoring of operation requirements of § 60.116b. These requirements will be incorporated into the permit.

Subpart GG, Stationary Gas Turbines. There are no turbines located at this facility.

Subpart UU, Asphalt Processing and Asphalt Roofing Manufacture. This subpart affects each asphalt storage tank and each blowing still at petroleum refineries. Asphalt storage tanks and blowing stills that process and/or store asphalt used for roofing and other purposes and that commenced construction or modification after November 18, 1980, are subject to the requirements of this subpart. Asphalt storage tanks and blowing stills that process and/or store only non-roofing asphalt and that commenced construction or modification after May 26, 1981, are also subject to the requirements of this subpart. The Asphalt Blowstill was altered in 1992. However, since only the blowstill thermal oxidizer was replaced and no increase in emissions resulted from the project, the modification was not considered a modification under NSPS. Therefore, the Asphalt Blowstill is not subject to the requirements of this subpart.

EU	Point	Description
HI-801	P-117	Asphalt Blowstill and Thermal Oxidizer

Subpart VV, Equipment Leaks of VOC in the Synthetic Organic Manufacturing Industry. NSPS, Subpart GGG requires equipment in VOC service to comply with paragraphs §§ 60.482-1 through 60.482-10, 60.484, 60.485, 60.486, and 60.487 except as provided in § 60.593. All equipment affected under this permit are subject to NSPS, Subpart GGG.

Subpart XX, Bulk Gasoline Terminals. This subpart affects loading racks at a bulk gasoline terminals which deliver liquid product into gasoline tank trucks and that commenced construction or modification after December 17, 1980. The light products loading terminal at the refinery was built prior to the applicable effective date of this subpart and was later modified to comply with NESHAP, Subpart CC. The new VOC railcar loading rack will be subject to NESHAP, Subpart CC. Due to the overlap requirements of NESHAP, Subpart CC and since these are Group 1 loading racks, the loading racks are only subject to NESHAP, Subpart CC.

Subpart DDD, VOC Emissions from the Polymer Manufacturing Industry. This subpart affects facilities that manufacture polyethylene, polypropylene, polystyrene, and polyethylene terephthalate. This facility does not manufacture any of these compounds.

Subpart GGG, Equipment Leaks of VOC in Petroleum Refineries. This subpart affects each valve, pump, pressure relief device, sampling connection system, open-ended valve or line, and flange or other connector in VOC service at a process unit that commenced construction or modification after January 4, 1983, and which is located at a petroleum refinery. The permit will require all affected equipment to comply with the applicable requirements of NSPS, Subparts GGG and VV. The permittee has elected to comply with the alternative standard for valves §§ 483-1 and 483-2.

Subpart III, VOC Emissions from SOCM I Air Oxidation Unit Processes. This subpart affects facilities with air oxidation reactors that produce, as a product, co-product, by-product, or intermediate, any of the chemicals listed in § 60.617. The Asphalt Blowstill is the only air oxidation process at the facility and it does not produce a listed chemical.

Subpart KKK, Equipment Leaks of VOC from Onshore Natural Gas Processing Plants. This subpart sets standards for natural gas processing plants which are defined as any site engaged in the extraction of natural gas liquids from field gas, fractionation of natural gas liquids, or both. This facility does not extract natural gas liquids from field gas or fractionate natural gas liquids.

Subpart LLL, Onshore Natural Gas Processing: SO₂ Emissions. This subpart affects each sweetening unit and each sweetening unit followed by a sulfur recovery unit that process natural gas which commenced construction or modification after January 20, 1984. Natural gas means a naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the earth's surface. This facility only processes gases that are generated at the facility from the processing of crude oil.

Subpart NNN, VOC Emissions from SOCM I Distillation Operations. This subpart affects facilities that are a part of a process unit that produce, as a product, co-product, by-product, or intermediate, any of the chemicals listed in § 60.667. This facility produces listed chemicals and uses distillation to separate the desired product. However, none of the distillation and recovery process streams are vented to the atmosphere.

Subpart OOO, Nonmetallic Mineral Processing Plants. This subpart affects each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station at nonmetallic mineral processing plants. This facility does not crush or grind any nonmetallic minerals.

Subpart QQQ, VOC Emission from Petroleum Refinery Wastewater Systems. This subpart applies to individual drain systems, oil-water separators, and aggregate facilities located in a petroleum refinery and which commenced construction, modification, or reconstruction after May 4, 1987. Drains are required to be equipped with water seal controls. Junction boxes are required to be equipped with a cover and may have an open vent pipe. Sewer lines shall not be open to the atmosphere and shall be covered or enclosed in a manner so as to have no visual gaps or cracks in joints, seals, or other emission interfaces. Oil-water wastewater separators shall be equipped with a fixed roof, which meets the required specifications. All required recordkeeping and equipment standards will be incorporated into the permit. Group 1 wastewater streams that are managed under this subpart that are also subject to the provisions of NESHAP, Subpart CC are only required to comply with Subpart CC.

Subpart RRR, VOC Emissions from SOCM I Reactor Processes. This subpart affects facilities that are a part of a process unit that produce, as a product, co-product, by-product, or intermediate, any of the chemicals listed in § 60.707. This facility produces listed chemicals and has a reactor to produce the desired products. However, all streams from the reactors are recovered. There are no vent streams to control.

NESHAP, 40 CFR Part 61

[Applicable]

Subpart J, Equipment Leaks (Fugitive Emission Sources) of Benzene. This subpart affects process streams that contain more than 10% benzene by weight. The maximum benzene concentration in any product stream at this site is 5% in super unleaded gasoline, and only trace amounts are expected in the refinery fuel gas.

Subpart FF, Benzene Waste Operations. This subpart affects benzene-contaminated wastewater at petroleum refineries. Facilities with less than 1-10 metric tons of benzene from facility waste are required to conduct annual determinations of the total annual benzene quantity from facility wastes. NESHAP, Part 63, Subpart CC requires all Group 1 wastewater streams to comply with §§ 61.340 through 61.355 of 40 CFR Part 61, Subpart FF for each process wastewater stream that meets the definition in § 63.641. All required monitoring, and recordkeeping requirements will be incorporated into the permit.

NESHAP, 40 CFR Part 63

[Subparts R, CC, and UUU are Applicable]

Subpart G, Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater. Subpart CC requires all Group 1 storage vessels to comply with §§ 63.119 through 63.121 of Subpart G. The following tanks are the Group 1 storage vessels affected by this permit. Tank T-155 is not subject due to the overlap provisions of NESHAP, Subpart CC.

EU	Point	Roof Type	Contents	Barrels
T-1018	P-2	External Floating	Naphtha	62,857
T-1019	P-3	External Floating	Alkylate & Gasoline	66,857
T-153	P-4	Fixed Roof	FCCU Charge	200,114
T-1115	P-23	External Floating	Gasoline	27,214
T-1130	P-36	External Floating	Gasoline	79,405
T-155	P-169	External Floating	Heavy Naphtha	164,000

Subpart Q, Industrial Cooling Towers. This subpart applies to all new and existing industrial process cooling towers that are operated with chromium-based water treatment chemicals on or after September 8, 1994, and are either major sources or are integral parts of facilities that are major sources as defined in § 63.401. This facility does not have or use industrial process cooling towers that are operated with chromium-based water treatment chemicals.

Subpart R, Gasoline Distribution Facilities. Bulk gasoline terminals or pipeline breakout stations with a Standard Industrial Classification code 2911 located within a contiguous area and under common control with a refinery complying with Subpart CC, §§ 63.646, 63.648, 63.649, and 63.650 are not subject to this subpart, except as specified in Subpart CC, § 63.650. Subpart CC, § 63.650(a) requires all facilities to comply with Subpart R, §§ 63.421, 63.422 (a) through (c), 63.425 (a) through (c), 63.425 (e) through (h), 63.427 (a) and (b), and 63.428 (b), (c), (g)(1), and (h)(1) through (h)(3). Subpart CC § 63.650(b) states that all terms not defined in § 63.641 shall have the meaning given them in Subpart A or in 40 CFR part 63, Subpart R and that the definition of “affected source” in § 63.641 applies under this section. § 63.650(c) requires all gasoline loading racks regulated under Subpart CC to comply with the compliance dates specified in § 63.640(h). All applicable requirements of this subpart, as per Subpart CC, are

incorporated into the permit for the light products loading terminal and the VOC railcar loading station.

Subpart CC, Petroleum Refineries. This subpart, promulgated on August 18, 1995, affects various process units and related emission points at petroleum refineries. The affected emission points are listed below with a summary of the applicable requirements. EU affected by this permit are shown in their respective sections.

Miscellaneous process vents from petroleum refining process units

Group 1 miscellaneous process vents must reduce emissions of organic HAPs using a flare or a control device which reduces emissions by 98 % weight or to a concentration of 20 ppmv. Group 1 miscellaneous process vents are vents associated with petroleum process refining units that contain greater than 20 ppmv organic HAPs and approximately 73 lb/day of VOCs at an existing source or 15 lb/day at a new source prior to control. There are no Group 1 miscellaneous process vents affected by this permit.

Storage vessels associated with petroleum refining process units, bulk gasoline terminals, or pipeline breakout stations

Group 1 storage vessels are required to comply with §§ 63.119 through 63.121 of Subpart G except as provided for in § 63.646(b) through (l). Group 1 storage vessels for an existing source are vessels that meet the following requirements:

- A design capacity greater than or equal to 46,758 gallons;
- Store a liquid with a maximum true vapor pressure greater than or equal to 1.5 psia;
- Store a liquid with a annual average true vapor pressure greater than or equal to 1.2 psia; and
- Store a liquid with an annual average HAP concentration greater than 4 percent by weight.

The following tanks are the Group 1 storage vessels affected by this permit.

EU	Point	Roof Type	Contents	Barrels
T-1018	P-2	External Floating	Naphtha	62,857
T-1019	P-3	External Floating	Alkylate & Gasoline	66,857
T-153	P-4	Fixed Roof	FCCU Charge	200,114
T-1115	P-23	External Floating	Gasoline	27,214
T-1130	P-36	External Floating	Gasoline	79,405
T-155	P-169	External Floating	Heavy Naphtha	164,000

Group 2 storage vessels that are part of an existing source and subject to the provisions of NSPS Subpart Kb are only required to comply with the provisions of NSPS Subpart Kb except as provided in § 63.640(n)(8)(i) through (vi). The following tanks are the Group 2 storage vessels affected by this permit.

EU	Point	Roof Type	Contents	Barrels	Const. Date
T-83001	P-56	Cone	Sour Water	18,500	1993
T-155	P-169	External Floating	Heavy Naphtha	164,000	2003-4

No controls or inspections are required for Group 2 storage vessels.

Wastewater streams and treatment operations associated with petroleum refining process units

Group 1 wastewater streams are required to comply with §§ 61.340 through 61.355 of 40 CFR Part 61, Subpart FF for each process wastewater stream that meets the definition in § 63.641. Group 1 wastewater streams are petroleum wastewater streams that meet the following requirements:

- A total annual benzene loading of approximately 11 tons per year as calculated in § 61.342;
- A flow rate greater than or equal to 0.317 gallons per hour;
- A benzene concentration of 10 ppm weight or greater; and
- Are not exempt from the control requirements of 40 CFR Part 61, Subpart FF.

Group 1 wastewater streams that are affected by this subpart and that are managed under NSPS, Subpart QQQ are only required to comply with Subpart CC. Any Group 1 wastewater stream affected by this permit will be required to comply with this subpart. All applicable requirements will be incorporated into the permit.

Equipment leaks from petroleum refining process units, bulk gasoline terminals, or pipeline breakout stations

All equipment in organic HAP service is required to comply with the provisions of 40 CFR Part 60, Subpart VV, except as provided in § 63.648(a)(1), (a)(2), and (c) through (i). All equipment subject to NSPS Subpart GGG and this subpart is only required to comply with this subpart. All equipment in organic HAP service will be required to comply with this subpart. All applicable requirements will be incorporated into the permit.

Gasoline loading racks or pipeline breakout stations

Gasoline loading racks are required to comply with Subpart R, §§ 63.421, 63.422 (a) through (c), 63.425 (a) through (c), 63.425 (e) through (h), 63.427 (a) and (b), and 63.428 (b), (c), (g)(1), and (h)(1) through (h)(3). The Light Products Loading Rack and VOC railcar loading rack are subject to this section and all applicable requirements will be incorporated into this permit.

Marine vessel loading operations

There are no marine vessel loading operations at this facility.

Sulfur plant vents and fuel gas emission points are specifically exempted from this subpart. All applicable emission limits, work practices, monitoring, and recordkeeping requirements of this subpart will be incorporated into the permit.

Subpart UUU, Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units. This subpart, affects the following EUs:

- Catalytic cracking units that regenerate catalyst;
- Catalytic reforming units that regenerate catalyst; and
- Sulfur recovery units and the tail gas treatment unit serving it;

- Each bypass line serving a new, existing, or reconstructed catalytic cracking unit, catalytic reforming unit, or sulfur recovery unit.

All existing affected sources are required to comply with this subpart by April 11, 2005, except as provided by § 63.1563(c). This subpart does not apply to thermal catalytic cracking units or gaseous streams routed to a fuel gas system.

Catalytic cracking units subject to the NSPS, Subpart J, PM emissions limits must comply with the NSPS Subpart J, PM emission limit. Catalytic cracking units subject to the NSPS, Subpart J, CO emissions limits must comply with the NSPS Subpart J, CO emission limit. Catalytic reforming units must comply with one of the organic HAP emission limits of § 63.1566(a)(1)(i) or (ii), the inorganic HAP emission limits of § 63.1567(a)(1)(i) or (ii), and all other applicable requirements. Sulfur recovery units subject to the NSPS, Subpart J, SO₂ emission limits must comply with the NSPS Subpart J, SO₂ emission limit. Bypass lines must meet the work practice standards in Table 36 of this subpart. The SRU and FCCU are subject to NSPS, Subpart J and will meet all applicable requirements of this subpart and NSPS Subpart J. The Platformer CCR is a catalytic reforming unit and will be subject to the new standards of this subpart.

Subpart EEEE, Organic Liquids Distribution (Non-Gasoline). This subpart was proposed on April 2, 2002, and will affect organic liquid distribution (OLD) operations at major sources of HAPs with an organic liquid throughput greater than 7.29 million gallons per year (173,571 barrels/yr). This subpart affects the following EUs at existing facilities:

- Tanks with a capacity $\geq 20,000$ gallons but $< 40,000$ gallons that store an organic liquid that contains $> 5\%$ HAPs and that has an annual average vapor pressure ≥ 1.9 but < 11.1 psia;
- Tanks with a capacity $\geq 40,000$ gallons that store an organic liquid that contains $> 5\%$ HAPs and that has an annual average vapor pressure ≥ 0.75 psia.
- Transfer racks that loads at any position ≥ 11.8 million liters (3.12 million gallons) per year of organic liquids into a combination of tank trucks and railcars.

Sources controlled under another NESHAP are exempt from this subpart. There are no OLD operations affected by this permit.

Subpart LLLLL, Asphalt Processing. This subpart was promulgated on April 29, 2003, and will affect asphalt processing facilities and asphalt roofing manufacturing lines at major sources of HAP. Asphalt processing facilities include: asphalt flux blowing stills, asphalt flux storage tanks, oxidized asphalt storage tanks, and oxidized asphalt-loading racks. The asphalt processing facility at the refinery is subject to this subpart. The asphalt processing facility is required to comply with the emission control requirements of this subpart by May 1, 2006.

Subpart ZZZZ, Reciprocating Internal Combustion Engines (RICE). This subpart was proposed on December 19, 2002, and would affect RICE with a nameplate rating greater than 500 brake horsepower and which are located at a major source of HAPs. This facility is a major source of HAPs. As proposed, this subpart will apply to all RICE with a nameplate rating greater than 500 brake horsepower.

Subpart DDDDD, Industrial, Commercial and Institutional Boilers and Process Heaters. This subpart was proposed on January 13, 2003, and as proposed would only affect solid and liquid fired units at major sources of HAPs. Since all of the fuel-burning equipment at the facility, with the exception of engines, are gas fired, none of the units would be subject to this subpart.

Air Quality reserves the right to reopen this permit if any standard becomes applicable.

CAM, 40 CFR Part 64

[Applicable]

Compliance Assurance Monitoring (CAM), as published in the Federal Register on October 22, 1997, applies to any pollutant specific EU at a major source, that is required to obtain a Title V permit, if it meets all of the following criteria:

- It is subject to an emission limit or standard for an applicable regulated air pollutant;
- It uses a control device to achieve compliance with the applicable emission limit or standard; and
- It has potential emissions, prior to the control device, of the applicable regulated air pollutant greater than major source levels.

EUs subject to an emission limit or standard proposed after November 15, 1990, are exempt from the CAM requirements for that emission limit or standard. EUs subject to an emission limit or standard for which a Part 70 permit specifies a continuous compliance determination method are exempt from the CAM for that emission limit or standard.

None of the EUs meet the criteria stated above except for the Asphalt Blowstill and Thermal Oxidizer (VOC), the Gasoline Loading Rack (VOC), the VOC Railcar Loading Station (VOC), the FCCU WS (SO₂, CO, PM₁₀), the Platformer CCR (PM₁₀), and the SRU (SO₂). The Gasoline Loading Rack and VOC Railcar Loading Station are subject to NESHAP, Subpart CC and are exempt from this standard. The permit will require the permittee to continuously monitor the SO₂ and CO emissions from the FCCU WS and the WS operational parameters established during initial testing (WGS liquid flow rate and pressure drop) to ensure compliance with the PM₁₀ emission limits. Emissions from the Asphalt Blowstill Thermal Oxidizer and Platformer CCR are below the major source levels after control and do not have to comply with CAM until renewal of their Title V operating permit. However, the permit will require the permittee to monitor and record the operational parameters of the thermal oxidizer (presence of flame on oxidizer) and Platformer CCR to ensure compliance with the established emission limits. The SRU uses a control device but does not have the potential to emit major source levels prior to control.

Chemical Accident Prevention Provisions, 40 CFR Part 68

[Applicable]

This facility handles naturally occurring hydrocarbon mixtures at a refinery and the Chemical Accident Prevention Provisions are applicable to this facility. The facility was required to submit the appropriate emergency response plan prior to June 21, 1999. The facility has submitted their plan which was given EPA No. 12005 for EPA Facility No. 1000 00128177. More information on this federal program is available on the web page: www.epa.gov/ceppo.

Stratospheric Ozone Protection, 40 CFR Part 82

[Applicable]

This facility does not produce, consume, recycle, import, or export any controlled substances or controlled products as defined in this part, nor does this facility perform service on motor (fleet) vehicles that involves ozone-depleting substances. Therefore, as currently operated, this facility is not subject to these requirements. To the extent that the facility has air-conditioning units that apply, the permit requires compliance with Part 82.

SECTION IX. TIER CLASSIFICATION, PUBLIC REVIEW, AND FEES

A. Tier Classification and Public Review

This application has been determined to be Tier II based on the request for a construction permit modification that is considered significant under OAC 252:100-8-7.2(b)(2).

The permittee has submitted an affidavit that they are not seeking a permit for land use or for any operation upon land owned by others without their knowledge. The affidavit certifies that the applicant owns the land used to accomplish the permitted purpose.

The applicant published the "Notice of Filing a Tier II Application and Draft Permit" in the *Daily Ardmoreite*, a daily newspaper, in Carter County, on February 27, 2004. The notice stated that the application and draft permit were available for public review at the Ardmore Public Library located at 320 E. NW, Ardmore, Oklahoma, and the draft permit was also available for review at the AQD Main Office and on the Air Quality section of the DEQ web page at <http://www.deq.state.ok.us>. This facility is located within 50 miles of the Oklahoma - Texas border. The state of Texas has been notified of the draft permit. The permit was also forwarded to EPA Region VI. No comments were received from the public, the State of Texas, or EPA Region VI.

B. Fees Paid

Construction permit application fee of \$1,500 for an existing Part 70 source.

SECTION X. SUMMARY

The applicant has demonstrated the ability to comply with all applicable Air Quality rules and regulations. Ambient air quality standards are not threatened at this site. Compliance and Enforcement concur with the issuance of this modified permit. Issuance of the permit is recommended.

**PERMIT TO COSTRUCT
AIR POLLUTION CONTROL FACILITY
SPECIFIC CONDITIONS**

**Valero Energy Corporation
TPI Petroleum, Inc.**

Permit No. 98-172-C (M-15) (PSD)

Valero Ardmore Refinery

Administrative Consent Order No. 02-007, Existing Sulfur Recovery Unit (SRU) with Tail Gas Treating Unit (TGTU), & Amine Recovery Unit (ARU), New Boiler/CO Boiler, and Alkylate Railcar Loading Station

The permittee is authorized to construct in conformity with the specifications submitted to Air Quality on December 30, 1998, April 21, 2000, June 10, 2002, March 24, 2003, September 9, 2003, January 15, 2004, and January 20, 2004. The Evaluation Memorandum dated April 12, 2004, explains the derivation of applicable permit requirements and estimates of emissions; however, it does not contain operating limitations or permit requirements. As required by Administrative Consent Order No. 02-007, effective March 3, 2002 and applicable state and federal regulations, the permittee is authorized to construct, and/or operate, the affected equipment in conformity with the specifications contained herein. Commencing construction, or operations, under this permit constitutes acceptance of, and consent to, the conditions contained herein:

1. Upon issuance of an operating permit, the permittee shall be authorized to operate the affected facilities noted in this permit continuously (24 hours per day, every day of the year) subject to the following conditions: [OAC 252:100-8-6(a)(1)]

- a. The crude unit shall not process fresh feedstock at a rate to exceed 85,000 bbl/day based on a 12-month rolling average.
- b. The fluid catalytic cracking unit (FCCU) shall not process fresh feedstock at a rate to exceed 30,000 bbl/day based on a 12-month rolling average.
- c. The catalytic reforming/platforming unit shall not process fresh feedstock at a rate to exceed 23,000 bbl/day based on a 12-month rolling average.
- d. The asphalt blowstill shall not process fresh feedstock at a rate to exceed 14,000 bbl/day based on a 12-month rolling average.
- e. The polymer modified asphalt (PMA) unit shall not produce PMA at a rate to exceed 3,600,000 bbl/yr based on a 12-month rolling total.

2. Emission limitations and standards for affected Emission Units (EU):

EUG 2 Storage Tank T-1018. There are no emission limits for EU T-1018 since this tank is grandfathered but it is limited to the existing equipment as it is.

EU	Point	Roof Type	Contents	Barrels
T-1018	P-2	External Floating	Alkylate & Gasoline	62,857

- a. The permittee shall comply with the applicable sections of NESHAP, 40 CFR Part 63, Subpart CC for the affected tank.
- i. §63.642 General Standards
 - ii. §63.646 Storage Vessel Provisions
 - iii. §63.654 Reporting and Recordkeeping Requirements

EUG 3 Storage Tank T-1019. There are no emission limits for EU T-1019 since this tank is grandfathered but it is limited to the existing equipment as it is.

EU	Point	Roof Type	Contents	Barrels
T-1019	P-3	External Floating	Alkylate & Gasoline	66,857

- a. The permittee shall comply with the applicable sections of NESHAP, 40 CFR Part 63, Subpart CC for the affected tank.
- i. §63.642 General Standards
 - ii. §63.646 Storage Vessel Provisions
 - iii. §63.654 Reporting and Recordkeeping Requirements

EUG 4 Storage Tank T-153. Emission limits for EU T-153. Emissions from EU T-153 are based on a throughput of 10,950,222 bbl/yr and a maximum liquid bulk temperature of 160 °F.

EU	Point	Roof Type	Contents	Barrels
T-153	P-4	Fixed Roof	FCCU Charge	200,114

VOC
TPY
1.5

- a. The throughput for EU T-153 shall not exceed 10,950,222 bbl/yr based on a 12-month rolling total. [OAC 252:100-8-6(a)(1)]
- b. Records of throughput shall be maintained (monthly and 12-month rolling total). [OAC 252:100-8-6(a)(3)]
- c. The temperature of the liquid shall not exceed 160 °F. [OAC 252:100-8-6(a)(1)]
- c. The temperature of the liquid shall be measured and recorded at least once daily. [OAC 252:100-8-6(a)(3)]

EUG 23 Storage Tank T-1115. There are no emission limits for EU T-1115 since this tank is grandfathered but it is limited to the existing equipment as it is.

EU	Point	Roof Type	Contents	Barrels
T-1115	P-23	External Floating	Gasoline	27,214

- a. The permittee shall comply with the applicable sections of NESHAP, 40 CFR Part 63, Subpart CC for the affected tank.
 - i. §63.642 General Standards
 - ii. §63.646 Storage Vessel Provisions
 - iii. §63.654 Reporting and Recordkeeping Requirements

EUG 24 Storage Tank T-1116. There are no emission limits for EU T-1116 since this tank is grandfathered but it is limited to the existing equipment as it is.

EU	Point	Roof Type	Contents	Barrels
T-1116	P-24	External Floating	Gasoline	27,310

- a. The permittee shall comply with the applicable sections of NESHAP, 40 CFR Part 63, Subpart CC for the affected tank.
 - i. §63.642 General Standards
 - ii. §63.646 Storage Vessel Provisions
 - iii. §63.654 Reporting and Recordkeeping Requirements

EUG 34 Storage Tank T-1130. Emissions from EU T-1130 are based on a throughput of 10,402,500 bbl/yr.

EU	Point	Roof Type	Contents	Barrels
T-1130	P-36	External Floating	Gasoline	79,405

VOC
TPY
26.8

- a. The permittee shall comply with the applicable sections of NESHAP, 40 CFR Part 63, Subpart CC for the affected tank.
 - i. §63.642 General Standards
 - ii. §63.646 Storage Vessel Provisions
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. The tank shall not store a VOC with a maximum vapor pressure greater than 11.0 psia under actual conditions.
- c. The throughput for EU T-1130 shall not exceed 10,402,500 bbl/yr based on a 12-month rolling total. [OAC 252:100-8-6(a)(1)]

- d. Records of throughput shall be maintained (monthly and 12-month rolling total).
[OAC 252:100-8-6(a)(3)]

EUG 38 Regenerated/Make Up Amine Storage Tank (V-523). There are no emission limits for EU V-523 since this tank is grandfathered but it is limited to the existing equipment as it is.

EU	Point	Roof Type	Contents	Barrels
V-523	P-41	Cone	Amine	86

EUG 49 Sour Water Stripper Tank (T-83001). Emission limits for EU T-83001. Emissions from EU T-83001 are based on a throughput of 2,565,500 bbl/yr and operation of the tank with a barrier of diesel fluid at least six inches thick.

EU	Point	Roof Type	Contents	Barrels
T-83001	P-56	Cone	Sour Water	18,500

VOC
TPY
6.2

- a. EU T-83001 shall be operated with a barrier of diesel fluid.
[OAC 252:100-8-6(a)(1)]
- b. The throughput for EU T-83001 shall not exceed 2,565,500 bbl/yr based on a 12-month rolling total.
[OAC 252:100-8-6(a)(1)]
- c. Records of throughput shall be maintained (monthly and 12-month rolling total).
[OAC 252:100-8-6(a)(3)]

EUG 101 Process Heater (H-102B). Emission limits and standards for EU H-102B are listed below. Emissions from H-102B are based on a maximum rated capacity (HHV) of 135 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas hydrogen sulfide (H₂S) concentration of 159 ppm_{dv}, except for emissions of NO_x, which are based on an emission factor of 0.059 lb/MMBTU.

EU	Point	Description	MMBTUH
H-102B	P-102	Process Heater	135.0

NO _x		CO		PM ₁₀		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8.0	34.9	11.1	48.7	1.6	7.2	4.5	19.8

- a. EU H-102B is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. H-102B shall be operated with Ultra Low-NO_x burners (ULNB). [OAC 252:100-8-34]
- c. Emissions of NO_x from EU H-102B shall not exceed 0.059 lb/MMBTU.
[OAC 252:100-8-34]
- d. Fuel use (SCF) and heat content (BTU/SCF) for EU H-102B shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- e. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above. Compliance with the TPY limits shall be based on a 12-month rolling total.

EUG 102 Process Heater (H-102A). Emission limits and standards for EU H-102A are listed below. Emissions from H-102A are based on a maximum rated capacity (HHV) of 160 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}, except for emissions of NO_x, which are based on an emission factor of 0.045 lb/MMBTU.

EU	Point	Description	MMBTUH
H-102A	P-103	Process Heater	160.0

NO _x		CO		PM ₁₀		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
7.2	31.5	13.2	57.7	1.8	8.5	5.4	23.5

- a. EU H-102A is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. H-102A shall be operated with ULNB. [OAC 252:100-8-34]
- c. Emissions of NO_x from EU H-102A shall not exceed 0.045 lb/MMBTU.
[OAC 252:100-8-34]
- d. Fuel use (SCF) and heat content (BTU/SCF) for EU H-102A shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- e. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above. Compliance with the TPY limits shall be based on a 12-month rolling total.

EUG 103 Process Heater (H-403). Emission limits and standards for EU H-403 are listed below. Emissions from H-403 are based on a maximum rated capacity (HHV) of 98.7 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-403	P-104	Process Heater	98.7

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
9.7	42.4	8.1	35.6	3.3	14.6

- a. EU H-403 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. Emissions of NO_x from EU H-403 shall not exceed 0.1 lb/MMBTU. [OAC 252:100-33]
- c. Fuel use (SCF) and heat content (BTU/SCF) for EU H-403 shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- d. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above.

EUG 104 Process Heater (H-404). Emission limits and standards for EU H-404 are listed below. Emissions from H-404 are based on a maximum rated capacity (HHV) of 48.5 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-404	P-105	Process Heater	48.5

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
4.8	20.8	4.0	17.5	1.6	7.1

- a. EU H-404 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)

EUG 105 Process Heater (H-405). Emission limits and standards for EU H-405 are listed below. Emissions from H-405 are based on a maximum rated capacity (HHV) of 50.3 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-405	P-106	Process Heater	50.8

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
5.0	21.8	4.2	18.3	1.7	7.5

- a. EU H-405 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. Emissions of NO_x from EU H-405 shall not exceed 0.1 lb/MMBTU. [OAC 252:100-33]

EUG 106 Process Heater (H-406). Emission limits and standards for EU H-406 are listed below. Emissions from H-406 are based on a maximum rated capacity (HHV) of 28.0 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-406	P-107	Process Heater	28.0

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
2.8	12.0	2.3	10.1	0.9	4.1

- a. EU H-406 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)

EUG 115 Process Flare (Crude Unit Flare). Emission limits and standards for EU Crude Unit Flare are listed below. Emissions from the Crude Unit Flare are based on a maximum rated capacity (HHV) of 28 MMBTUH, the respective emissions factors from AP-42, Section 13.5 (1/95), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
Crude Unit Flare	P-116	Process Flare	28

NO _x		CO		SO ₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1.8	8.0	10.0	43.8	0.9	4.0	3.8	16.6

- a. The flare is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- § 60.104 Standards for sulfur dioxide – (a)(1)
 - § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii) or other alternative monitoring approved per § 60.13.
 - § 60.106 Test methods and procedures – (e)
- b. The flare shall comply with all applicable requirements including but not limited to the following requirements:
[40 CFR Parts 60 and 63]
- The flare shall meet the design requirements of 40 CFR Part 60 NSPS, Subpart A.
 - The flare shall meet the design requirements of 40 CFR Part 63 National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart A.

EUG 116 Asphalt Blowstill and Thermal Oxidizer (HI-801). Emission limits and standards for EU HI-801 are listed below. Emissions from HI-801 are based on a maximum rated auxiliary fuel flow of 12 MMBTUH (HHV), a waste gas flow rate of 21,287 lb/hr with a heat content of 2,363 BTU/lb and a nitrogen content of 6.2 ppm_{dv}, the emissions factors from AP-42, Section 1.4 (7/98), and an H₂S concentration of 159 ppm_{dv}.

EU	Point	Description
HI-801	P-117	Asphalt Blowstill and Thermal Oxidizer

NO _x		CO		PM ₁₀		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
9.5	41.1	5.6	23.1	0.7	3.0	7.7	34.0

- a. EU HI-801 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- § 60.104 Standards for sulfur dioxide – (a)(1)
 - § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii) or other alternative monitoring approved per § 60.13.
 - § 60.106 Test methods and procedures – (e)
- b. All off-gases from the asphalt blowstill shall be combusted by a properly operated and maintained thermal oxidizer.
- c. The temperature of the combustion zone in the Thermal Oxidizer of EU HI-801 shall not drop below 1,100 °F.
- d. The permittee shall monitor and record the temperature of the combustion zone of the Thermal Oxidizer of EU HI-801 (daily).
- e. EU HI-801 shall not process more than 21,287 lb/hr of waste gas as determined by site-specific parametric association of waste-gas generation as a function of asphalt throughput and the air flow rate into the asphalt blowing process.

- f. The permittee shall monitor and record the asphalt throughput of the blowstill (daily).
- g. The permittee shall determine and record the amount of waste gas generated from the asphalt blowstill per barrel of asphalt (quarterly).

EUG 118 Process Heater (H-201). Emission limits and standards for EU H-201 are listed below. Emissions from H-201 are based on a maximum rated capacity (HHV) of 116.7 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}. NO_x emissions from H-201 are based on the factor for post-NSPS units >100 MMBTUH.

EU	Point	Description	MMBTUH
H-201	P-119	Process Heater	104.7

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
21.7	95.2	9.6	42.1	3.9	17.2

- a. EU H-201 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. Emissions of NO_x from EU H-201 shall not exceed 0.2 lb/MMBTU. [OAC 252:100-33]
- c. Fuel use (SCF) and heat content (BTU/SCF) for EU H-201 shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- d. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above.

EUG 120 Process Heater (H-401A). There are no emission limits for EU H-401A since this process heater is grandfathered but it is limited to the existing equipment as it is. Emissions from H-401A are based on a maximum rated capacity (HHV) of 16.0 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-401A	P-121	Process Heater	16.0

EUG 121 Process Heater (H-401B). Emission limits and standards for EU H-401B are listed below. Emissions from H-401B are based on a maximum rated capacity (HHV) of 14.8 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-401B	P-122	Process Heater	14.8

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1.5	6.4	1.2	5.3	0.5	2.2

- a. EU H-401B is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)

EUG 122 Process Heater (H-402A). There are no emission limits for EU H-402A since this process heater is grandfathered but it is limited to the existing equipment as it is. Emissions from H-402A are based on a maximum rated capacity (HHV) of 13.9 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-402A	P-123	Process Heater	13.9

EUG 123 Process Heater (H-402B). There are no emission limits for EU H-402B since this process heater is grandfathered but it is limited to the existing equipment as it is. Emissions from H-402B are based on a maximum rated capacity (HHV) of 15.8 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-402B	P-124	Process Heater	15.8

EUG 124 Process Heater (H-407). Emission limits and standards for EU H-407 are listed below. Emissions from H-407 are based on a maximum rated capacity (HHV) of 25.0 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-407	P-125	Process Heater	25.0

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
2.5	10.7	2.1	9.0	0.8	3.7

- a. EU H-407 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)

EUG 126 Boiler (B-802). Emission limits and standards for EU B-802 are listed below. Emissions from B-802 are based on a maximum rated capacity (HHV) of 89.8 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppmdv.

EU	Point	Description	MMBTUH
B-802	P-127	Boiler	89.8

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8.8	38.6	7.4	32.4	3.0	13.2

- a. EU B-802 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. Emissions of NO_x from EU B-802 shall not exceed 0.1 lb/MMBTU. [OAC 252:100-33]

EUG 127 Boiler (B-803). Emission limits and standards for EU B-803 are listed below. Emissions from B-803 are based on a maximum rated capacity (HHV) of 86.8 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppmdv.

EU	Point	Description	MMBTUH
B-803	P-128	Boiler	86.8

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8.5	37.3	7.2	31.3	2.9	12.8

- a. EU B-803 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. Emissions of NO_x from EU B-802 shall not exceed 0.1 lb/MMBTU. [OAC 252:100-33]

EUG 128 Process Heater (H-411). Emission limits and standards for EU H-411 are listed below. Emissions from H-411 are based on a maximum rated capacity (HHV) of 21.7 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBTUH
H-411	P-129	Process Heater	21.7

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
2.1	9.3	1.8	7.8	0.7	3.2

- a. EU H-411 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- § 60.104 Standards for sulfur dioxide – (a)(1)
 - § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - § 60.106 Test methods and procedures – (e)

EUG 134 Process Flare (HI-81001). Emission limits and standards for EU HI-81001 are listed below. Emissions from HI-81001 are based on a maximum rated capacity (HHV) of 27 MMBTUH, the respective emissions factors from AP-42, Section 13.5 (1/95), and a fuel gas H₂S concentration of 159 ppm_{dv}.

EU	Point	Description	MMBUH
HI-81001	P-135	Platformer and Alkylation Units	27

NO _x		CO		SO ₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1.9	8.3	10.4	45.4	0.9	4.1	3.9	17.2

- a. EU HI-81001 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
- § 60.104 Standards for sulfur dioxide – (a)(1)
 - § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii) or other alternative monitoring approved per § 60.13.
 - § 60.106 Test methods and procedures – (e)
- b. EU HI-81001 shall comply with all applicable requirements including but not limited to the following requirements:
[40 CFR Parts 60 and 63]
- EU HI-81001 shall meet the design requirements of 40 CFR Part 60 NSPS, Subpart A.
 - EU HI-81001 shall meet the design requirements of 40 CFR Part 63 NESHAP, Subpart A.

EUG 135 Process Heater (H-603). Emission limits and standards for EU H-603 are listed below. Emissions from H-603 are based on a maximum rated capacity (HHV) of 125.5 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}, except for emissions of NO_x and CO which are based on the following emission factors: 0.066 and 0.0415 lb/MMBTU, respectively.

EU	Point	Description	MMBTUH
H-603	P-136	Process Heater	125.5

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8.3	36.3	5.2	22.8	4.2	18.5

- a. EU H-603 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. H-603 shall be operated with LNB. [OAC 252:100-8-34]
- c. Emissions of NO_x from EU H-603 shall not exceed 0.066 lb/MMBTU.
[OAC 252:100-8-34]
- d. Emissions of CO from EU H-603 shall not exceed 0.0415 lb/MMBTU.
[OAC 252:100-8-34]
- e. Fuel use (SCF) and heat content (BTU/SCF) for EU H-603 shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- f. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above.

EUG 136 Process Heater (H-6501). Emission limits and standards for EU H-6501 are listed below. Emissions from H-6501 are based on a maximum rated capacity (HHV) of 92.1 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}, except for emissions of NO_x and CO which are based on the following emission factors: 0.060 and 0.0404 lb/MMBTU, respectively.

EU	Point	Description	MMBTUH
H-6501	P-137	Process Heater	92.1

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
5.5	24.2	3.7	16.3	3.1	13.6

- a. EU H-6501 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. H-6501 shall be operated with LNB. [OAC 252:100-8-34]
- c. Emissions of NO_x from EU H-6501 shall not exceed 0.060 lb/MMBTU.
[OAC 252:100-8-34]
- d. Emissions of CO from EU H-6501 shall not exceed 0.0404 lb/MMBTU.
[OAC 252:100-8-34]
- e. Fuel use (SCF) and heat content (BTU/SCF) for EU H-6501 shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- f. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above.

EUG 137 Process Heater (H-6502). Emission limits and standards for EU H-6502 are listed below. Emissions from H-6502 are based on a maximum rated capacity (HHV) of 54.3 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppmv, except for emissions of NO_x and CO which are based on the following emission factors: 0.060 and 0.0404 lb/MMBTU, respectively.

EU	Point	Description	MMBTUH
H-6502	P-138	Process Heater	54.3

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
3.3	14.3	2.2	9.6	1.8	8.0

- a. EU H-6502 is subject to New Source Performance Standards (NSPS), Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. H-6502 shall be operated with LNB. [OAC 252:100-8-34]
- c. Emissions of NO_x from EU H-6502 shall not exceed 0.060 lb/MMBTU.
[OAC 252:100-8-34]
- d. Emissions of CO from EU H-6502 shall not exceed 0.0404 lb/MMBTU.
[OAC 252:100-8-34]
- e. Fuel use (SCF) and heat content (BTU/SCF) for EU H-6502 shall be monitored and recorded (monthly). [OAC 252:100-8-6(a)(3)]
- f. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above.

EUG 138 Process Heater (H-15001). Emission limits and standards for EU H-15001 are listed below. Emissions from H-15001 are based on a maximum rated capacity (HHV) of 326.8 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppm_{dv}, except for emissions of NO_x and CO which were based on an emission factor of 0.037 lb/MMBTU and 0.030 lb/MMBTU, respectively.

EU	Point	Description	MMBTUH
H-15001	P-139	Process Heater	326.8

NO _x		CO		PM ₁₀		SO ₂		VOC	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
12.1	53.0	9.8	42.9	2.4	10.7	11.0	48.1	1.8	7.7

- a. EU H-15001 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. EU H-15001 shall be operated with LNB.
- c. Emissions of NO_x from EU H-15001 shall not exceed 0.037 lb/MMBTU.
[OAC 252:100-8-34]
- d. Emissions of CO from EU H-15001 shall not exceed 0.030 lb/MMBTU.
[OAC 252:100-8-34]
- e. Fuel use (SCF) and heat content (BTU/SCF) for EU H-15001 shall be monitored and recorded (monthly).
[OAC 252:100-8-6(a)(3)]
- f. Compliance with the emission limitations shall be based on the fuel consumption, fuel heat content, and the emission factors used to calculate emissions indicated above.

EUG 139 Process Heater (H-210001). Emission limits and standards for EU H-210001 are listed below. Emissions from H-210001 are based on a maximum rated capacity (HHV) of 12.2 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 4 ppm_{dv}.

EU	Point	Description	MMBTUH
H-210001	P-140	Process Heater	12.2

NO _x		CO	
lb/hr	TPY	lb/hr	TPY
1.2	5.2	1.0	4.4

- a. EU H-210001 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)

- iii. § 60.106 Test methods and procedures – (e)
- b. EU H-210001 is subject to NSPS, Subpart Dc and shall comply with all applicable provisions. [40 CFR Part 60, Subpart Dc]
 - i. The permittee shall record and maintain records of the amounts of each fuel combusted in EU H-210001 during each day. [40 CFR 60.48c(g)]
- c. EU H-210001 shall only be fired with commercial grade natural gas. [OAC 252:100-31]

EUG 140 Gasoline Loading Rack Vapor Combustor (Light Products Loading Terminal). Emission limits and standards for the Light Products Loading Terminal are listed below. Emissions from the Light Products Loading Terminal Vapor Combustor are based on the following: an hourly loading limit of 155,782 gallons/hour of gasoline/diesel; an annual loading limit of 22,525,714 bbl/yr of gasoline/diesel; and the following factors: VOC and CO: 10 mg/L loaded; NO_x: 4 mg/L loaded. Fugitive VOC emissions from the Light Products Loading Terminal are based on calculated loading losses and a 99.2% collection efficiency for gasoline.

EU	Point
Light Products Loading Terminal (LPLT)	P-141

	NO _x		CO		VOC	
Source	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Vapor Combustor	5.2	15.8	13.0	39.5	17.2	39.5

- a. The amount of gasoline and diesel loaded at the Light Products Loading Rack shall not exceed 155,782 gallons/hr based on a daily average or 22,525,714 bbl/year based on a 12-month rolling total. [OAC 252:100-8-6(a)(3)]
- b. The LPLT vapor combustor is subject to NSPS, Subpart J and shall comply with all applicable provisions. [40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii) or other alternative monitoring approved per § 60.13.
 - iii. § 60.106 Test methods and procedures – (e)
- c. The LPLT vapor combustor shall comply with all applicable requirements including but not limited to the following requirements: [40 CFR Part 63]
 - i. The vapor combustor shall meet the design requirements of 40 CFR Part 63 NESHAP, Subpart A.
- d. The Light Products Loading Terminal is subject to NESHAP, 40 CFR Part 63, Subpart CC and shall comply with all applicable requirements. [40 CFR 63, NESHAP, Subpart CC]
 - i. §63.642 General Standards.
 - ii. §63.650 Gasoline Loading Rack Provisions.
 - iii. §63.654 Reporting and Recordkeeping Requirements.

EUG 141* FCCU Flue Gas Scrubber (FGS-200). Emission limits and standards for EU FGS-200 are listed below. Emissions from the FGS are based on a BACT analysis and a supplemental environmental project.

EU	Point	Description
FGS-200	P-142	FCCU No. 1 Regenerator/CO Boiler and FCCU No. 2 Regenerator

* - EUGs 141A, 141B, and 141C, will all be vented to this EUG and point upon completion of the modifications. EUG 145 will either be vented to this EUG or another wet scrubber.

	NO _x		CO		PM ₁₀ *		SO ₂	
Scenario	lb/hr	TPY**	lb/hr	TPY**	lb/hr	TPY**	lb/hr	TPY**
1	74.7	217.7	46.9	106.0	22.4	51.3	66.4	223.6
2	74.7	217.7	46.9	106.0	26.2	53.2	66.4	223.6

* - The PM₁₀ emission limits are based only on the front-half of the PM₁₀ sampling train.

** - Based on a 12-month rolling average.

- 1 - Represents emissions from the FCCU Flue Gas Scrubber (FGS-200) without the FCCU Catalyst Hoppers Vent (cat-hop) being vented to the FCCU Flue Gas Scrubber (FGS-200).
 - 2 - Represents emissions from FCCU Flue Gas Scrubber (FGS-200) with the FCCU Catalyst Hoppers Vent (cat-hop) being vented to the FCCU Flue Gas Scrubber (FGS-200).
- a. The new and existing CO Boilers shall be operated with LNB. [OAC 252:100-8-34]
 - b. All of the FCCU feedstock with the exception of charge filter backwash shall be hydrotreated. [OAC 252:100-8-34]
 - c. EU FGS-200 shall be equipped with a continuous emissions monitoring system (CEMS) for determining and recording NO_x emissions. [OAC 252:100-8-6(a)(3)]
 - d. The permittee shall compute the 12-month rolling average NO_x emissions from EU FGS-200 using the monthly average monitored NO_x concentrations along with the monthly average dry-basis stack gas flow rate.
 - e. The off-gases from the FCCU No. 1 Regenerator shall be combusted in a CO Boiler prior to being processed by the FGS to reduce emissions of CO. [OAC 252:100-8-34]
 - f. The emissions of CO from the FCCU No. 1 Regenerator shall be reduced by use of complete secondary combustion of the waste gas generated. [OAC 252:100-35-2(b)]
 - i. Emissions of CO from the FCCU No. 1 Regenerator shall be vented to and completely combusted in the CO Boiler.
 - g. The existing FCCU No. 1 Regenerator's CO Boiler and Incinerator shall be replaced by a new CO Boiler capable of handling all of the FCCU No. 1 Regenerator off-gases. The existing FCCU No. 1 Regenerator's CO Boiler shall be retrofitted with LNB and maintained in standby or limited supplemental service. The existing FCCU No. 1 Regenerator's Incinerator shall be decommissioned. [CO 02-007 (IV)(4)(B)]
 - h. The FCCU No. 2 Regenerator shall be operated in full combustion regeneration mode to reduce emissions of CO. [OAC 252:100-8-34 & 100-35-2(b)]
 - i. EU FGS-200 shall be equipped with a CEMS for determining and recording CO emissions. [OAC 252:100-8-6(a)(3)]

- j. The permittee shall compute the 12-month rolling average CO emissions from EU FGS-200 using the monthly average monitored CO concentrations along with the monthly average dry-basis stack gas flow rate.
- k. All off-gases from the FCCU No. 1 Regenerator/CO Boiler system and the FCCU No. 2 Regenerator shall be treated by a Wet Scrubber (WS) to control emissions of SO₂ from the FCCU. [OAC 252:100-8-34]
 - i. The WS shall be designed and operated with devices that reduce the amount of entrained water in the WS off-gases.
- l. EU FGS-200 shall be equipped with a CEMS for determining and recording SO₂ emissions. [OAC 252:100-8-6(a)(3)]
- m. The permittee shall compute the 12-month rolling average SO₂ emissions from EU FGS-200 using the monthly average monitored SO₂ concentrations along with the monthly average dry-basis stack gas flow rate.
- n. The FCCU No. 1 Regenerator shall be operated with dual cyclones and the FCCU No. 2 Regenerator shall be operated with tertiary cyclones. The cyclones are within the Regenerators and shall be used to reduce emissions of PM₁₀. [OAC 252:100-34]
- o. The permittee shall install monitors to continuously monitor and record the following parameters of the WS:
 - i. Liquid flow rate of the WS (24-hour average).
 - ii. Gas temperature and flow rate through the WS (24-hour average).
 - iii. Liquid to Gas Ratio of the WS (24-hour average).
 - iv. Pressure drop across the WS (24-hour average).
 - v. pH of the WS liquor (24-hour average).
 - vi. These parameters are parametric indicators of the WS desired control efficiency. The indicator ranges for these parameters shall be determined based on actual performance tests data established during the initial performance tests to determine the WS control efficiency. Monitored operating parameters may be adjusted (flow rate, pressure drop, or liquid-to-gas ratio) from the average of measured values during the performance test to a maximum value (or minimum value, if applicable) representative of worst-case operating conditions, if necessary. This adjustment of measured values may be done using additional performance tests or control device design specifications and manufacturer recommendations in conjunction with an engineering assessment. The permittee shall provide supporting documentation and rationale demonstrating to the satisfaction of the AQD, that the FCCU Flue Gas Scrubber complies with all applicable emission limits at the proposed operating limits.
 - vii. The permittee may request to monitor alternative parameters than those listed above. The request to monitor alternative parameters shall be submitted for review and approval or disapproval to the AQD. The request shall include the following information:
 - A. The parameter(s) to be monitored to establish compliance of the FCCU Flue Gas Scrubber with all applicable emission limitations;
 - B. A justification for the alternative monitoring parameter(s) and all supporting information used to determine that the selected alternative monitoring parameter(s) will demonstrate compliance with the applicable emission limitations;

- C. A description of the methods and procedures that will be used to demonstrate that the parameter(s) can be used to determine the FCCU Flue Gas Scrubber will continuously comply with all applicable emission limitations and the schedule for this demonstration. The permittee shall certify that an operating limitation will be established for the monitored parameter(s) that represents the conditions of the WS when it is being properly operated and maintained to meet the applicable emission limitations;
 - D. If monitoring and recording are not continuous, the frequency and content of the monitoring, recordkeeping, and reporting. The permittee shall also include the rationale for the proposed monitoring, recordkeeping, and reporting requirements; and
 - E. Averaging time for the alternative operating parameter(s).
- viii. The gas flow rate can be determined through the use of other parametric indicators such as regenerator flowrates based on coke production and combustion, flue-gas CO₂ concentration and flue-gas O₂ concentration, daily regenerator flue gas analysis's, CO boiler combustion calculations, and other parameters that may be monitored.
- p. The FCCU is subject to NSPS, 40 CFR Part 60, Subpart J and shall comply with all applicable requirements. [40 CFR 60, NSPS, Subpart J]
- i. §60.102 Standard for particulate matter.
 - ii. §60.103 Standard for carbon monoxide.
 - iii. §60.104 Standard for sulfur oxides – (b-d).
 - iv. §60.105 Monitoring of emissions and operations – (a)(1), (a)(2), (a)(8-13), (c), (d), (e)(1), and (e)(2) or other alternative monitoring approved per § 60.13.
 - v. §60.106 Test Methods and Procedures(a-d) and (g-k).
 - vi. §60.107 Reporting and Recordkeeping Requirements (a-f).
 - vii. §60.108 Performance Test and Compliance Provisions (a-e).
- q. The FCCU is subject to NESHAP, 40 CFR Part 63, Subpart UUU and shall comply with all applicable requirements by the dates specified in §63.1563(b). [40 CFR 63, NESHAP, Subpart UUU]

EUG 141A FCCU No. 1 Regenerator and CO Boiler/Incinerator (HI-251). The FCCU No. 1 Regenerator and CO Boiler will be vented to the WS and all emissions are associated with EU FGS-200. The FCCU No. 1 Incinerator will be decommissioned.

EU	Point	Description
HI-251	P-143	FCCU No. 1 Regenerator and CO Boiler/Incinerator

- a. All emissions from the FCCU No. 1 Regenerator shall be processed through a CO Boiler (EU B-253 or B-252) and then vented through the FCCU FGS. [OAC 252:100-8-34]
- b. The FCCU No. 1 Incinerator shall be decommissioned. [CO 02-007 (IV)(4)(B)]

EUG 141B CO Boilers (B-252, B-253, and B-254). The CO Boilers are vented to the WS and all emissions are associated with EU FGS-200.

EU	Point	Description	MMBTUH
B-252	P-143	CO Boiler	92.0
B-253	P-143	CO Boiler	125.8
B-254	P-143	Boiler/CO Boiler	144.0

- a. The CO Boilers shall be vented to the FCCU WS. [OAC 252:100-8-34]
- b. The CO Boilers shall be equipped with LNB or ULNB. [OAC 252:100-8-34]
- c. All emissions from the FCCU No. 1 Regenerator shall be processed through EU B-253.
- d. EU B-252 shall be maintained in standby or limited supplemental service. [CO 02-007 (IV)(4)(B)]
- e. EU B-252, B-253, and B-254 are subject to NSPS, Subpart J and shall comply with all applicable provisions. [40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- f. EU B-252 is subject to NSPS, Subpart Dc and shall comply with all applicable provisions. [40 CFR Part 60, Subpart Dc]
 - i. The permittee shall record and maintain records of the amounts of each fuel combusted in EU B-252 during each day. [40 CFR 60.48c(g)]
- g. EU B-253 and B-254 are subject to NSPS, Subpart Db and shall comply with all applicable provisions. [40 CFR Part 60, Subpart Db]
 - i. § 60.44b Standard for Nitrogen Oxides – (e), (f), (h), (i), (j), (k)
 - ii. § 60.46b Compliance and Performance Test Methods and Procedures for Nitrogen Oxides – (c), (e), (g)
 - iii. § 60.48b Emission monitoring for Nitrogen Oxides – (b), (c), (d), (e), (f), (g), (h), (i)
 - iv. § 60.49b Reporting and Recordkeeping Requirements (a) through (p)
- h. Emissions of NO_x from EU B-253 shall not exceed 0.03 lb/MMBTU. [OAC 252:100-33]
- i. Emissions of NO_x from EU B-254 shall not exceed 0.06 lb/MMBTU. [OAC 252:100-33]
- j. EU B-252 shall be removed from service when EU B-254 becomes operational.

EUG 141C FCCU No. 2 Regenerator (R-251). The FCCU No. 2 Regenerator is vented to the WS and all emissions are associated with EU FGS-200.

EU	Point	Description
R-251	P-142	FCCU No. 2 Regenerator

- a. The FCCU No. 2 Regenerator shall be operated in full combustion regeneration mode. [OAC 252:100-8-34 & 100-35-2(b)]
- b. The FCCU No. 2 Regenerator shall be vented to the FCCU WS. [OAC 252:100-8-34]

EUG 142 SRU Incinerator EU HI-501. Emission limits for the SRU Incinerator. NO_x, CO, VOC, and PM₁₀ emissions from the incinerator are based on combustion of 8.2 MMBTUH of auxiliary fuel, combustion of 217,512 SCFH of waste gas with a heat content of 23 BTU/SCF, and AP-42, Section 1.4 (7/98). SO₂ emissions are based on a flow rate of 288,212 DSCFH @ 0% O₂ and the NSPS, Subpart J, SO₂ emission limit of 250 ppmdv.

EU	Point	Description	MMBTUH
HI-501	P-144	SRU Incinerator	13.2

NO _x		SO ₂	
lb/hr	TPY	lb/hr	TPY
1.9	8.5	11.9 ¹	52.0

¹ – 2-hour average of contiguous 1-hour averages.

- a. The SRU shall be equipped with a tail gas-treating unit (TGTU). The TGTU shall process the off-gases from the SRU. The sulfur production of the SRU shall not exceed 119 LTD based on a 365-day rolling average. [OAC 252:100-8-6(a)(1)]
- b. EU H-501 is subject to NSPS, Subpart J and shall comply with all applicable provisions. [40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(2)(i);
 - ii. § 60.105 Monitoring of operations – (a)(5)(i & ii) & (e)(4)(i);
 - iii. § 60.106 Test methods and procedures – (a) & (f)(1 & 3).
- c. EU H-501 is subject to NESHAP, Subpart UUU and shall comply with all applicable provisions by the dates specified in § 63.1563(b). [40 CFR Part 63, Subpart UUU]
 - i. § 63.1568 What are my requirements for HAP emissions from sulfur recovery units? – (a)(1), (b)(1, 3, 4, 5, 6, & 7), & (c)(1 & 2);
 - ii. § 63.1569 What are my requirements for HAP emissions from bypass lines? – (a)(1 & 3), (b)(1-4), & (c)(1 & 2);
 - iii. § 63.1570 What are my general requirements for complying with this subpart? – (a) & (c-g);
 - iv. 63.1571 How and when do I conduct a performance test or other initial compliance demonstration? – (a) & (b)(1-5);
 - v. 63.1572 What are my monitoring installation, operation, and maintenance requirements? – (a)(1-4) & (d)(1-2);
 - vi. 63.1574 What notifications must I submit and when? – (a)(2) & (f)(1, 2(i), 2(ii), 2(viii), 2(ix), & 2(x));
 - vii. 63.1575 What reports must I submit and when? – (a-h);
 - viii. 63.1576 What records must I keep, in what form, and for how long? – (a), (b)(1, 3, 4, 5), & (d-i);
 - ix. 63.1577 What parts of the General Provisions apply to me?
- d. EU H-5001 is subject to OAC 252:100-31-26 and shall comply with all applicable provisions. [OAC 252:100-31-26]
 - i. H₂S from any new petroleum or natural gas process equipment shall be removed from the exhaust gas stream or it shall be oxidized to sulfur dioxide. H₂S emissions shall be reduced by 95% of the H₂S in the exhaust gas. [OAC 252:100-31-26(a)(1)]

- ii. Sulfur recovery plants operating in conjunction with any refinery process shall have the sulfur reduction efficiencies required below. [OAC 252:100-31-26(a)(2)(B)]
 - A. When the sulfur content of the acid gas stream from the refinery process is greater than 5.0 LT/D but less than or equal to 150.0 LT/D, the required sulfur dioxide emission reduction efficiency of the sulfur recovery plant shall be calculated using the following formula where Z is the minimum emission reduction efficiency required at all times and X is the sulfur feed rate expressed in LT/D of sulfur rounded to one decimal place: $Z = 92.34 (X^{0.00774})$ [OAC 252:100-31-26(a)(2)(D)]
- iii. All new thermal devices for petroleum and natural gas processing facilities regulated under OAC 252:100-31-26(a)(1) shall have installed, calibrated, maintained, and operated an alarm system that will signal non-combustion of the gas. [OAC 252:100-31-26(c)]

EUG 143 Emergency Generators (EEQ-8801 and EEQ-80001). Emission limits and standards for EU EEQ-8801 and EEQ-80001 are listed below. Emissions from the emergency generators are based on 800 hours of operation a year, a diesel fuel heating value of 19,500 BTU/lb, a fuel sulfur content of 0.05% by weight, and the following:

EEQ-8801 - A maximum fuel input of 461.5 lb/hr and the respective emissions factors from AP-42, Section 3.3 (10/96);

EEQ-80001 - A maximum fuel input of 106.5 lb/hr and the respective emissions factors from AP-42, Section 3.4 (10/96).

EU	Point	Make/Model	KW	Serial #
EEQ-8801	P-145	DMT/DMT-825D2	750	93447-1
EEQ-80001	P-146	Cummins/6BT5.9G-2	80	45555233

	NO _x		CO		SO ₂	
EEQ	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
8801	28.8	11.5	7.7	3.1	0.5	0.2
80001	9.2	3.7	2.0	0.8	0.1	0.04

- a. EU EEQ-8801 and EEQ-80001 shall not operate more than 800 hours per year each based on a 12-month rolling total.
- b. EU EEQ-8801 and EEQ-80001 shall be fitted with non-resettable hour-meters.
- c. The sulfur content of the fuel for EU EEQ-8801 and EEQ-80001 shall not exceed 0.05% by weight (on-road low-sulfur diesel performance specification). [OAC 252:100-31]
- d. The permittee shall maintain records of the diesel fuel purchase receipts documenting the sulfur content for each delivery of diesel fuel or shall determine and record the fuel sulfur content for each delivery of diesel fuel for the generators. [OAC 252:100-45]
- e. A serial number or another acceptable form of permanent (non-removable) identification shall be on each generator.

EUG 145 FCCU Catalyst Hopper Vent (cat_hop). Emissions limits for the FCCU Catalyst Hoppers are based on venting emissions to a WS or equally effective control device.

EU	Point	Description
cat_hop	P-149	FCCU Catalyst Hopper Vent

Scenario	PM ₁₀ *	
	lb/hr	TPY**
1	3.8	1.9
2	0.0	0.0

* - The PM₁₀ emission limits are based only on the front-half of the PM₁₀ sampling train.

** - Based on a 12-month rolling average.

- 1 - Represents emissions from the FCCU Catalyst Hoppers Vent (cat-hop) without the FCCU Catalyst Hoppers Vent (cat-hop) being vented to the FCCU Flue Gas Scrubber (FGS-200).
 - 2 - Represents emissions from the FCCU Catalyst Hoppers Vent (cat-hop) with the FCCU Catalyst Hoppers Vent (cat-hop) being vented to the FCCU Flue Gas Scrubber (FGS-200).
- a. The FCCU Catalyst Hoppers shall be vented through a cyclone and then to the FCCU WS (FGS-200) or another equally effective control device. [OAC 252:100-8-34]
 - b. If the permittee does not vent the FCCU Catalyst Hoppers to the FCCU WS, the permittee shall monitor and record the following parameters of the WS or other parameters as necessary to ensure compliance with the emission limit above:
 - i. Liquid flow rate of the WS (24-hour average).
 - ii. Pressure drop across the WS (24-hour average).
 - iii. These parameters are parametric indicators of the WS desired control efficiency. The indicator ranges for these parameters shall be determined based on actual performance tests data established during the initial performance tests to determine the WS control efficiency.

EUG 146 Platformer Catalyst Regeneration Vent (CCR). Emission limits and standards for EU CCR are listed below. Emissions from the CCR are based on a coke-burning rate of 49 lbs/hr, which is equivalent to a maximum catalyst recirculation rate of 700 lb/hr and a coke combustion rate of 7% of the catalyst processing rate (700 lb/hr @ 7% wt), with a coke maximum sulfur content of 0.5% by weight. Coke combustion emissions were based on the respective emissions factors from AP-42 (1/95), Section 1.1, for sub-bituminous coal combustion. PM₁₀ emissions also include a recovery factor for the catalyst of 99.99%.

EU	Point	Description
CCR	P-150	Platformer Catalyst Regeneration Combustion Vent

NO _x		CO		PM ₁₀		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
0.8	3.7	0.1	0.5	0.4	1.7	0.5	2.0

- a. The catalyst recirculation rate shall not exceed 700 lb/hr. [OAC 252:100-8-6(a)(1)]
- b. The CCR shall be operated in full combustion regeneration mode to reduce emissions of CO to at least 100 ppmv. [OAC 252:100-35-2(b)]
 - i. At least once per calendar quarter, the permittee shall conduct tests of CO concentrations in the exhaust gases from the CCR when operating under representative conditions. Testing shall be conducted using a portable analyzer or an equivalent method approved by Air Quality. When four consecutive quarterly tests show compliance with the CO emissions limitation, the testing frequency may be reduced to semi-annual testing.
- c. The sulfur content of the Platformer feed shall not exceed 5 ppmw. [OAC 252:100-8-6(a)(1)]
- d. The permittee shall determine and record the sulfur content of the CCR feed (quarterly). [OAC 252:100-45]
- e. The CCR is subject to NESHAP, 40 CFR Part 63, Subpart UUU and shall comply with all applicable requirements by the dates specified in §63.1563(b). [40 CFR 63, NESHAP, Subpart UUU]

EUG 147 Instrument/Plant Air Compressor (C-80018). Emission limits and standards for EU C-80018 are listed below. Emissions from C-80018 are based on 4,000 hours of operation a year, a horsepower rating of 450-hp, the respective emissions factors from AP-42, Section 3.3 (10/96), and a fuel sulfur content of 0.05% by weight.

EU	Point	Make/Model	Hp	Serial #	Const. Date
C-80018	P-151	Detroit Diesel/8V-92TA	450	69102	1993

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
14.0	27.9	3.0	6.0	0.2	0.4

- a. EU C-80018 shall not operate more than 4,000 hours per year based on a 12-month rolling total.
- b. EU C-80018 shall be fitted with a non-resettable hour-meter.
- c. The sulfur content of the fuel for EU C-80018 shall not exceed 0.05% by weight. (on-road low-sulfur diesel performance specification) [OAC 252:100-31]
- d. The permittee shall maintain records of the diesel fuel purchase receipts documenting the sulfur content for each delivery of diesel fuel or shall determine and record the fuel sulfur content for each delivery of diesel fuel for the Instrument/Plant Air Compressor. [OAC 252:100-45]

- e. EU C-80018 shall be equipped with permanent (non-removable) identification such as a serial number or another acceptable form of identification.
- f. Placement of EU C-80018 shall be limited to the north end of the FCCU area.
[OAC 252:100-3]

EUG 148 Process Heater (H-100024). Emission limits and standards for EU H-100024 are listed below. Emissions from H-100024 are based on a maximum rated capacity (HHV) of 13.5 MMBTUH, the respective emissions factors from AP-42, Section 1.4 (7/98), and a fuel gas H₂S concentration of 159 ppmv.

EU	Point	Description	MMBTUH
H-100024	P-152	Asphalt Tank Heater	13.5

NO _x		CO		SO ₂	
lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
0.7	3.0	1.1	4.9	0.5	2.0

- a. EU H-100024 is subject to NSPS, Subpart J and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart J]
 - i. § 60.104 Standards for sulfur dioxide – (a)(1)
 - ii. § 60.105 Monitoring of operations – (a)(4), (e)(3)(ii)
 - iii. § 60.106 Test methods and procedures – (e)
- b. EU H-100024 is subject to NSPS, Subpart Dc and shall comply with all applicable provisions.
[40 CFR Part 60, Subpart Dc]
 - i. The permittee shall record and maintain records of the amounts of each fuel combusted in EU H-100024 during each day.
[40 CFR 60.48c(g)]

EUG 169 Storage Tank T-155. Emissions from EU T-155 are based on a throughput of 9,490,000 bbl/yr.

EU	Point	Roof Type	Contents	Barrels
T-155	169	External Floating	Heavy Naphtha	164,000

VOC
TPY
2.6

- a. The throughput for EU T-155 shall not exceed 9,490,000 bbl/yr based on a 12-month rolling total.
[OAC 252:100-8-6(a)(1)]
- b. Records of throughput shall be maintained (monthly and 12-month rolling total).
[OAC 252:100-8-6(a)(3)]

EUG 175 #1 SRU Sulfur Storage Pit (SSP-520). Emissions from EU SSP-520 are based on a H₂S concentration of 8,000 ppmv, a run-down rate of 10,908 lb/hr of molten sulfur (119 LTD), and the density of molten sulfur (124.8 lb/CF).

EU	Point	Contents
SSP-520	SSP-520	Sulfur

- a. The throughput for EU SSP-520 shall not exceed 119 LTD based on a 365-day rolling average. [OAC 252:100-8-6(a)(1)]
- b. Records of throughput shall be maintained (monthly and 12-month rolling average). [OAC 252:100-8-6(a)(3)]
- c. Emissions of H₂S from the sulfur pit shall not exceed 0.3 lb/hr based on a 2-hour average. Compliance shall be determined using the run down rate and the H₂S concentration of the gases coming from the sulfur storage pit. The H₂S concentration shall be determined at least once annually using stain tubes. [OAC 252:100-31-26(b)(1)]

EUG 176 #1 SRU Molten Sulfur Railcar Loading Arm (MSLA-520). Emissions from EU MSLA-520 are based on a H₂S concentration of 8,000 ppmv, a loading rate of 100,000 lb/hr of molten sulfur, and the density of molten sulfur (124.8 lb/CF).

EU	Point	Loading Rack	Loading Arm
MSLA-520	MSLA-520	1	1

- a. EU MSLA-520 is subject to OAC 252:100-31-26 and shall comply with all applicable provisions. [OAC 252:100-31-26]
 - i. Emissions of H₂S from the loading operation shall not exceed 0.3 lb/hr based on a 2-hour average. Compliance shall be determined using the loading rate and the H₂S concentration of the gases coming from the loading operation. The H₂S concentration shall be determined at least once monthly using stain tubes.
 - ii. If emissions are determined to be greater than 0.3 lb/hr, the H₂S from any new petroleum or natural gas process equipment shall be removed from the exhaust gas stream or it shall be oxidized to sulfur dioxide. H₂S emissions shall be reduced by 95% of the H₂S in the exhaust gas. [OAC 252:100-31-26(a)(1)]

EUG 185 VOC Railcar Loading Station. All emissions from the VOC Railcar Loading Station shall be vented through the Asphalt Blowstill Incinerator (HI-801). Emissions from the VOC Railcar Loading Station are based on the following: an hourly loading limit of 13,200 gallons/hour of gasoline/alkylate; an annual loading limit of 733,505 bbl/yr of gasoline/alkylate; and the following: VOC: 10 mg/L loaded; NO_x and CO: AP-42 (1/95), Section 13.5.

EU	Point	Loading Rack	Loading Arm
RCALOAD 900	P-185	1	1

- a. The amount of gasoline/alkylate loaded at the VOC Railcar Loading Station shall not exceed 13,200 gallons/hr based on a daily average or 733,505 bbl/year based on a 12-month rolling total. [OAC 252:100-8-6(a)(1)]
- b. The VOC Railcar Loading Station is subject to NESHAP, 40 CFR Part 63, Subpart CC and shall comply with all applicable requirements. [40 CFR 63, NESHAP, Subpart CC]
 - i. §63.642 General Standards.
 - ii. §63.650 Gasoline Loading Rack Provisions.
 - iii. §63.654 Reporting and Recordkeeping Requirements.

EUG 200 Crude Unit Fugitive Sources (Area 100). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable Leak Detection and Repair (LDAR) program.

EU	Point	Number Items	Type of Equipment
Area 100	F-100	2,338	Valves
		3,876	Flanges
		15	Other
		46	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 205 Amine Fuel Gas Treating System Fugitive Sources (Area 550). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 550	F-105	403	Valves
		677	Flanges
		4	Other
		11	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 206 Saturates Gas Plant Fugitive Sources (Area 300). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 300	F-106	835	Valves
		1,389	Flanges
		12	Other
		7	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 207 Reformer “Platformer” Fugitive Sources (Area 400). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 400	F-107	2,074	Valves
		3,488	Flanges
		23	Other
		16	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 208 Isomerization Unit Fugitive Sources (Area 450). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 450	F-108	786	Valves
		1,294	Flanges
		17	Other
		5	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 211 HF Alkylation Unit Fugitive Sources (Area 900). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 900	F-111	2,295	Valves
		3,803	Flanges
		23	Other
		31	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 214 Wastewater Treatment Unit Fugitive Sources (ASU). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR programs.

EU	Point	Number Items	Type of Equipment
ASU	F-114	154	Valves
		258	Flanges
		---	Other
		6	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 219 Olefin Treating Unit Fugitive VOC Emissions (Area 250). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 250	F-119	1,118	Valves
		969	Flanges
		5	Other
		12	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 232 #1 TGTU & ARU Unit Fugitive VOC Emissions (Area 500). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 500	F-500	231	Valves
		369	Flanges
		5	Other
		9	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
 - i. §63.642 General Standards
 - ii. §63.648 Equipment Leak Standards
 - iii. §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
 - i. §60.592 Standards
 - ii. §60.593 Exceptions

EUG 233 1 SRU TGTU & ARU Wastewater Processing Fugitive VOC Emissions (WW-500). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
WW-500	F-500b	27	P-Trap
		2	Junction Box

- a. The EUG 233 is subject to NESHAP, 40 CFR Part 63, Subpart CC and shall comply with all applicable requirements. [40 CFR 63, NESHAP, Subpart CC]
- §63.642 General Standards.
 - §63.647 Wastewater Provisions.
 - §63.654 Reporting and Recordkeeping Requirements.

EUG 234 #1 SRU Fugitive VOC Emissions (Area 520). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
Area 520	F-520	141	Valves
		240	Flanges
		2	Other
		5	Pumps

- a. All affected equipment, in HAP service (contacting >5% by weight HAP), shall comply with NESHAP, 40 CFR Part 63, Subpart CC. The permittee shall comply with the applicable sections for each affected component.
- §63.642 General Standards
 - §63.648 Equipment Leak Standards
 - §63.654 Reporting and Recordkeeping Requirements
- b. Equipment determined not to be in HAP service (contacting <5% by weight HAP) shall comply with the requirements of NSPS, 40 CFR Part 60, Subpart GGG.
- §60.592 Standards
 - §60.593 Exceptions

EUG 235 #1 SRU Wastewater Processing Fugitive VOC Emissions (Area WW-520). Fugitive VOC emissions are estimated based on existing equipment items but do not have a specific limitation except to comply with the applicable LDAR program.

EU	Point	Number Items	Type of Equipment
WW-520	F-520b	10	P-Trap

- a. The EUG 233 is subject to NESHAP, 40 CFR Part 63, Subpart CC and shall comply with all applicable requirements. [40 CFR 63, NESHAP, Subpart CC]
- §63.642 General Standards.
 - §63.647 Wastewater Provisions.
 - §63.654 Reporting and Recordkeeping Requirements.

3. Certain equipment within the refinery is subject to NSPS, 40 CFR Part 60, Subpart QQQ and all affected equipment shall comply with all applicable requirements.

[40 CFR 60, NSPS, Subpart QQQ]

- a. § 60.692–1 Standards: General.
- b. § 60.692–2 Standards: Individual drain systems.
- c. § 60.692–3 Standards: Oil-water separators.
- d. § 60.692–4 Standards: Aggregate facility.
- e. § 60.692–5 Standards: Closed vent systems and control devices.
- f. § 60.692–6 Standards: Delay of repair.
- g. § 60.692–7 Standards: Delay of compliance.
- h. § 60.693–1 Alternative standards for individual drain systems.
- i. § 60.693–2 Alternative standards for oil-water separators.
- j. § 60.695 Monitoring of operations.
- k. § 60.696 Performance test methods and procedures and compliance provisions.
- l. § 60.697 Recordkeeping requirements.
- m. § 60.698 Reporting requirements.

4. The Refinery is subject to NESHAP, 40 CFR Part 61, Subpart FF and shall comply with all applicable requirements.

[40 CFR 61, NESHAP, Subpart FF]

- a. § 61.342 Standards: General.
- b. § 61.343 Standards: Tanks.
- c. § 61.344 Standards: Surface Impoundments.
- d. § 61.345 Standards: Containers.
- e. § 61.346 Standards: Individual drain systems.
- f. § 61.347 Standards: Oil-water separators.
- g. § 61.348 Standards: Treatment processes.
- h. § 61.349 Standards: Closed-vent systems and control devices.
- i. § 61.350 Standards: Delay of repair.
- j. § 61.351 Alternative standards for tanks.
- k. § 61.352 Alternative standards for oilwater separators.
- l. § 61.353 Alternative means of emission limitation.
- m. § 61.354 Monitoring of operations.
- n. § 61.355 Test methods, procedures, and compliance provisions.
- o. § 61.356 Recordkeeping requirements.
- p. § 61.357 Reporting requirements.

5. Certain equipment within the refinery is subject to NESHAP, 40 CFR Part 63, Subpart CC and all affected equipment shall comply with all applicable requirements including but not limited to:

[40 CFR 63, NESHAP, Subpart CC]

- a. § 63.642 General Standards
- b. § 63.643 Miscellaneous Process Vent Provisions
- c. § 63.644 Monitoring for Miscellaneous Process Vents

- d. § 63.645 Test Methods and Procedures for Miscellaneous Process Vents
- e. § 63.646 Storage Vessel Provisions
- f. § 63.647 Wastewater Provisions
- g. § 63.648 Equipment Leak Standards
- h. § 63.652 Emission Averaging Provisions
- i. § 63.653 Monitoring, Recordkeeping, and Implementation Plan for Emissions Averaging
- j. § 63.654 Reporting and Recordkeeping Requirements
- k. The permittee shall comply with the provisions of 40 CFR Part 63 Subpart A as specified in Appendix to Subpart CC, Table 6.

6. Within 60 days of achieving start-up of the WS on the FCCU, not to exceed 180 days from initial start-up, and at other such times as directed by Air Quality, the permittee shall conduct performance testing as follows and furnish a written report to Air Quality. Such report shall document compliance with all specific conditions and applicable requirements.

[OAC 252:100-8-6(a)(3)]

- a. The permittee shall conduct NO_x, CO, PM₁₀, and SO₂ testing on the FCCU within 90% of the permitted maximum feedstock flowrate. Performance testing shall include determination of the nitrogen and sulfur content of the FCCU feedstock.
- b. If the FCCU Catalyst Hoppers are not vented to the FCCU WS, the permittee shall conduct PM₁₀ testing on the control device for the FCCU Catalyst Hoppers during actual operation/loading of the FCCU Catalyst Hoppers.
- c. The permittee shall conduct NO_x emission testing on EU H-201 within 90% of the permitted maximum rated heat input.
- d. The permittee shall conduct NO_x and CO emission testing on C-80018 within 90% of the maximum rated load. Testing for the engine can be conducted using portable engine analyzers or an equivalent method approved by Air Quality.
- e. The permittee may report all PM emissions measured by USEPA Method 5B as PM₁₀, including back half condensable particulate. If the permittee reports USEPA Method 5B PM emissions as PM₁₀, testing using USEPA Method 201 or 201A need not be performed. Compliance with the BACT emission limits shall be determined using only the front-half of the PM₁₀ sampling train. Compliance with the emission limits established by OAC 252:100-19 shall be determined using the front-half and the back-half of the PM₁₀ sampling train.
- f. Testing protocols shall be submitted to the Air Quality Division describing the required testing. The permittee shall provide a copy of the testing protocol, and notice of the actual test date, to AQD for review and approval at least 30 days prior to the start of such testing.
- g. The permittee shall use any approved USEPA test methods codified in 40 CFR Part 60 Appendix A, for testing of emissions, unless otherwise approved by Air Quality.
- h. All CEMS shall meet the performance specifications codified in 40 CFR Part 60 Appendix B unless otherwise approved by Air Quality.
- i. Testing conducted under this specific condition shall be used to certify the CEMS.

7. The permittee shall conduct daily visual observations of the opacity from the EU HI-801, and CCR exhausts and keep a record of these observations. In no case, shall the observation period be less than six minutes in duration. If visible emissions are observed for six minutes in duration for any observation period and such emissions are not the result of a malfunction, then the permittee shall conduct, within 24 hours, a visual observation of emissions, in accordance with 40 CFR Part 60, Appendix A, Method 9. [OAC 252:100-25]

- a. When five consecutive daily visible emission observations or Method 9 observations show no visible emissions, or no emissions of a shade or density greater than twenty (20) percent equivalent opacity, respectively, the frequency may be reduced to weekly visual observations, as above. Likewise, when the following four consecutive weekly observations show compliance, the observation frequency may be reduced to monthly observations. Upon any showing of non-compliance the observation frequency shall revert to daily.
- b. If a Method 9 observation exceeds 20% opacity the permittee shall conduct at least two additional Method 9 observations within the next 24-hours.
- c. If more than one six-minute Method 9 observation exceeds 20% opacity in any consecutive 60 minutes; or more than three six-minute Method 9 observations in any consecutive 24 hours exceeds 20% opacity; or if any six-minute Method 9 observation exceeds 60% opacity; the owner or operator shall comply with the provisions for excess emissions during start-up, shut-down, and malfunction of air pollution control equipment.

8. Until 12 consecutive months of data has been collected to determine the 12-month rolling averages applicable to the facility, the facility shall fill the missing data for the previous months with an estimated average monthly figure based on the applicable rolling average divided by 12. If there exists enough data to determine the values for the previous months, it can be used to determine the applicable 12-month rolling averages. [OAC 252:100-8-6(a)(3)]

9. The permittee shall maintain records as specified in Specific Condition 1 and 2 including but not limited to those listed below. These records shall be maintained on-site for at least five years after the date of recording and shall be provided to regulatory personnel upon request. [OAC 252:100-43]

- a. Operating hours for EU EEQ-8801, EEQ-80001, and C-80018 (monthly and 12-month rolling totals).
- b. Compliance with all applicable 12-month rolling averages or totals (monthly).
- c. Throughput of the loading rack (daily).
- d. CEMS data as required.
- e. Records required by NSPS, Subparts Dc, Kb, J, GGG, and QQQ and NESHAP, Subparts FF and CC.
- f. Visible emission observations (date, time, and reading).

10. When monitoring shows an exceedance of any of the limits of Specific Condition No. 2, the owner or operator shall comply with the provisions of OAC 252:100-9 for excess emissions.

[OAC 252:100-9]

11. The permittee shall implement the BACT and the SEP for the FCCU No. 1 and No. 2 Regenerators, CO Boiler, and the FCCU Catalyst Receiving Hopper as specified in Specific Condition 2, Consent Order (CO) 02-007, and the approved BACT report dated April 18, 2000. These BACT controls shall be installed according to the following schedule:

- a. Design engineering of the relevant BACT controls shall be completed within 90 days of issuance of Permit No. 98-172-C (PSD) (Issued – January 13, 2003).
- b. Construction of the relevant BACT controls shall be completed within 28 months of issuance of Permit No. 98-172-C (PSD) (Issued – January 13, 2003).
- c. Performance testing and submittal to Air Quality of a report documenting compliance with this permit, following a reasonable shakedown period for the installed controls, shall not exceed 180 days after completion of construction of the BACT.

[CO 02-007 (IV)(3)(C)(3) and (4) and (IV)(4)(B)]

12. The permittee shall implement the BACT for the Crude Unit Equipment Fugitive Emissions as specified in Specific Condition 2 and the approved BACT report dated April 18, 2000. The BACT controls shall be implemented according to the following schedule:

- a. Implementation of the relevant BACT controls shall be completed within 30 days of issuance of Permit No. 98-172-C (PSD) (Issued – January 13, 2003).
- b. Performance testing and submittal to Air Quality of a report documenting compliance with this permit shall be completed within 60 days of issuance of Permit No. 98-172-C (PSD) (Issued – January 13, 2003).

[CO 02-007 (IV)(3)(C)(2)]

13. The permittee shall submit to Air Quality a new/updated Part 70 permit application, within 180 days after performance testing and submittal to DEQ of the reports referenced in Specific Conditions 11 and 12 and in CO 02-007 (IV)(3)(C) documenting compliance with the PSD permit. With this permit update, the permittee shall submit to Air Quality a CAM plan in accordance with 40 CFR Part 64 for the emissions units specified in CO 02-007 (IV)(3)(C)(5) and CO 02-007 (IV)(3)(F) to the extent that 40 CFR Part 64 is applicable to each such unit.

[CO 02-007 (IV)(3)(C)(5)]

14. Unless otherwise provided by the AQD, the permittee shall, within 90 days of issuance of Permit No. 98-172-C (PSD) (Issued – January 13, 2003), submit a plan, program, and schedule setting forth all activities necessary to achieve compliance with all applicable PSD and NSPS requirements set forth in Administrative Order 02-007 (Compliance Plan). The Compliance Plan shall include specific dates by which:

- a. Design information applicable to emission control devices to be installed/constructed will be submitted to DEQ;

- b. Contracts for fabrication and installation of said control device systems will be let and completed;
- c. Initial startup, testing and shakedown of said control device systems will be commenced and completed; and
- d. Final compliance with all applicable conditions of the permit and consent order will be achieved. [CO 02-007 (IV)(3)(G)]

15. The Refinery shall, within 90 days after submittal of the CAM plan and Part 70 permit application referenced in Specific Condition 13 to Air Quality, submit a Compliance Certification demonstrating compliance with all applicable PSD and minor source permitting, NSPS, Part 70 permitting, and CAM plan requirements set forth in this permit and CO 02-007. [CO 02-007 (IV)(3)(H)]

16. The permittee shall submit to DEQ quarterly progress reports summarizing activities undertaken pursuant to this permit and CO 02-007 for the preceding quarter and projecting activities for the ensuing quarter. The first report shall be submitted within 45 days after the conclusion of the first full calendar quarter following the Effective Date of CO 02-007 (Effective - March 7, 2002). The report for each quarter thereafter shall be submitted within 45 days after the expiration of such quarter. [CO 02-007 (IV)(3)(I)]

17. Within 180 days of the date of issuance of Permit No. 98-172-C (M-12) (Issued - June 9, 2003), the permittee shall submit plans for post-construction ambient air monitoring of PM₁₀ (24-hour impact). Deficiencies in the monitoring plan shall be corrected as soon as possible but no later than prior to start-up of the facility. Monitoring shall be commenced with 180 days of start-up of the facility and shall be conducted for a period of at least 12 consecutive months in accordance with the approved monitoring plan. [OAC 252:100-8-35(d)(5)]

18. As used in this permit, the term “day” or “day(s)” shall mean calendar days, provided that, where the date of completion or submittal of any item required by this permit falls on a weekend or on a state or federal holiday (whether the relevant time period is specified in terms of days, months or otherwise), the date of completion or submittal of that item shall be deferred until the next day that is not on a weekend or state or federal holiday. [CO 02-007 (IV)(2)]

19. Upon issuance of this permit, this permit supercedes Permit No. 98-172-C (M-13)(PSD), which is now null and void.

**TITLE V (PART 70) PERMIT TO OPERATE / CONSTRUCT
STANDARD CONDITIONS
(October 15, 2003)**

SECTION I. DUTY TO COMPLY

A. This is a permit to operate / construct this specific facility in accordance with Title V of the federal Clean Air Act (42 U.S.C. 7401, et seq.) and under the authority of the Oklahoma Clean Air Act and the rules promulgated there under. [Oklahoma Clean Air Act, 27A O.S. § 2-5-112]

B. The issuing Authority for the permit is the Air Quality Division (AQD) of the Oklahoma Department of Environmental Quality (DEQ). The permit does not relieve the holder of the obligation to comply with other applicable federal, state, or local statutes, regulations, rules, or ordinances. [Oklahoma Clean Air Act, 27A O.S. § 2-5-112]

C. The permittee shall comply with all conditions of this permit. Any permit noncompliance shall constitute a violation of the Oklahoma Clean Air Act and shall be grounds for enforcement action, for revocation of the approval to operate under the terms of this permit, or for denial of an application to renew this permit. All applicable requirements (excluding state-only requirements) are enforceable by the DEQ, by EPA, and by citizens under section 304 of the Clean Air Act. This permit is valid for operations only at the specific location listed.

[OAC 252:100-8-1.3 and 8-6 (a)(7)(A) and (b)(1)]

D. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit. [OAC 252:100-8-6 (a)(7)(B)]

SECTION II. REPORTING OF DEVIATIONS FROM PERMIT TERMS

A. Any exceedance resulting from emergency conditions and/or posing an imminent and substantial danger to public health, safety, or the environment shall be reported in accordance with Section XIV. [OAC 252:100-8-6 (a)(3)(C)(iii)]

B. Deviations that result in emissions exceeding those allowed in this permit shall be reported consistent with the requirements of OAC 252:100-9, Excess Emission Reporting Requirements.

[OAC 252:100-8-6 (a)(3)(C)(iv)]

C. Oral notifications (fax is also acceptable) shall be made to the AQD central office as soon as the owner or operator of the facility has knowledge of such emissions but no later than 4:30 p.m. the next working day the permittee becomes aware of the exceedance. Within ten (10) working days after the immediate notice is given, the owner operator shall submit a written report describing the extent of the excess emissions and response actions taken by the facility. Every written report submitted under this section shall be certified by a responsible official.

[OAC 252:100-8-6 (a)(3)(C)(iii)(I) and (iv)]

SECTION III. MONITORING, TESTING, RECORDKEEPING & REPORTING

A. The permittee shall keep records as specified in this permit. These records, including monitoring data and necessary support information, shall be retained on-site or at a nearby field office for a period of at least five years from the date of the monitoring sample, measurement, report, or application, and shall be made available for inspection by regulatory personnel upon request. Support information includes all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. Where appropriate, the permit may specify that records may be maintained in computerized form.

[OAC 252:100-8-6 (a)(3)(B)(ii), 8-6 (c)(1), and 8-6 (c)(2)(B)]

B. Records of required monitoring shall include:

- (1) the date, place and time of sampling or measurement;
- (2) the date or dates analyses were performed;
- (3) the company or entity which performed the analyses;
- (4) the analytical techniques or methods used;
- (5) the results of such analyses; and
- (6) the operating conditions as existing at the time of sampling or measurement.

[OAC 252:100-8-6 (a)(3)(B)(i)]

C. No later than 30 days after each six (6) month period, after the date of the issuance of the original Part 70 operating permit, the permittee shall submit to AQD a report of the results of any required monitoring. All instances of deviations from permit requirements since the previous report shall be clearly identified in the report.

[OAC 252:100-8-6 (a)(3)(C)(i) and (ii)]

D. If any testing shows emissions in excess of limitations specified in this permit, the owner or operator shall comply with the provisions of Section II of these standard conditions.

[OAC 252:100-8-6 (a)(3)(C)(iii)]

E. In addition to any monitoring, recordkeeping or reporting requirement specified in this permit, monitoring and reporting may be required under the provisions of OAC 252:100-43, Testing, Monitoring, and Recordkeeping, or as required by any provision of the Federal Clean Air Act or Oklahoma Clean Air Act.

F. Submission of quarterly or semi-annual reports required by any applicable requirement that are duplicative of the reporting required in the previous paragraph will satisfy the reporting requirements of the previous paragraph if noted on the submitted report.

G. Every report submitted under this section shall be certified by a responsible official.

[OAC 252:100-8-6 (a)(3)(C)(iv)]

H. Any owner or operator subject to the provisions of NSPS shall maintain records of the occurrence and duration of any start-up, shutdown, or malfunction in the operation of an affected facility or any malfunction of the air pollution control equipment. [40 CFR 60.7 (b)]

I. Any owner or operator subject to the provisions of NSPS shall maintain a file of all measurements and other information required by the subpart recorded in a permanent file suitable for inspection. This file shall be retained for at least two years following the date of such measurements, maintenance, and records. [40 CFR 60.7 (d)]

J. The permittee of a facility that is operating subject to a schedule of compliance shall submit to the DEQ a progress report at least semi-annually. The progress reports shall contain dates for achieving the activities, milestones or compliance required in the schedule of compliance and the dates when such activities, milestones or compliance was achieved. The progress reports shall also contain an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventative or corrective measures adopted. [OAC 252:100-8-6 (c)(4)]

K. All testing must be conducted by methods approved by the Division Director under the direction of qualified personnel. All tests shall be made and the results calculated in accordance with standard test procedures. The permittee may request the use of alternative test methods or analysis procedures. The AQD shall approve or disapprove the request within 60 days. When a portable analyzer is used to measure emissions it shall be setup, calibrated, and operated in accordance with the manufacturer's instructions and in accordance with a protocol meeting the requirements of the "AQD Portable Analyzer Guidance" document or an equivalent method approved by Air Quality. [OAC 252:100-8-6 (a)(3)(A)(iv) and OAC 252:100-43]

L. The permittee shall submit to the AQD a copy of all reports submitted to the EPA as required by 40 CFR Part 60, 61, and 63, for all equipment constructed or operated under this permit subject to such standards. [OAC 252:100-4-5 and OAC 252:100-41-15]

SECTION IV. COMPLIANCE CERTIFICATIONS

A. No later than 30 days after each anniversary date of the issuance of the original Part 70 operating permit, the permittee shall submit to the AQD, with a copy to the US EPA, Region 6, a certification of compliance with the terms and conditions of this permit and of any other applicable requirements which have become effective since the issuance of this permit. The compliance certification shall also include such other facts as the permitting authority may require to determine the compliance status of the source.

[OAC 252:100-8-6 (c)(5)(A), (C)(v), and (D)]

B. The certification shall describe the operating permit term or condition that is the basis of the certification; the current compliance status; whether compliance was continuous or intermittent; the methods used for determining compliance, currently and over the reporting period; and a statement that the facility will continue to comply with all applicable requirements.

[OAC 252:100-8-6 (c)(5)(C)(i)-(iv)]

C. Any document required to be submitted in accordance with this permit shall be certified as being true, accurate, and complete by a responsible official. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete.

[OAC 252:100-8-5 (f) and OAC 252:100-8-6 (c)(1)]

D. Any facility reporting noncompliance shall submit a schedule of compliance for emissions units or stationary sources that are not in compliance with all applicable requirements. This schedule shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the emissions unit or stationary source is in noncompliance. This compliance schedule shall resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the emissions unit or stationary source is subject. Any such schedule of compliance shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based. Except that a compliance plan shall not be required for any noncompliance condition which is corrected within 24 hours of discovery.

[OAC 252:100-8-5 (e)(8)(B) and OAC 252:100-8-6 (c)(3)]

SECTION V. REQUIREMENTS THAT BECOME APPLICABLE DURING THE PERMIT TERM

The permittee shall comply with any additional requirements that become effective during the permit term and that are applicable to the facility. Compliance with all new requirements shall be certified in the next annual certification.

[OAC 252:100-8-6 (c)(6)]

SECTION VI. PERMIT SHIELD

A. Compliance with the terms and conditions of this permit (including terms and conditions established for alternate operating scenarios, emissions trading, and emissions averaging, but excluding terms and conditions for which the permit shield is expressly prohibited under OAC 252:100-8) shall be deemed compliance with the applicable requirements identified and included in this permit.

[OAC 252:100-8-6 (d)(1)]

B. Those requirements that are applicable are listed in the Standard Conditions and the Specific Conditions of this permit. Those requirements that the applicant requested be determined as not applicable are listed in the Evaluation Memorandum and are summarized in the Specific Conditions of this permit.

[OAC 252:100-8-6 (d)(2)]

SECTION VII. ANNUAL EMISSIONS INVENTORY & FEE PAYMENT

The permittee shall file with the AQD an annual emission inventory and shall pay annual fees based on emissions inventories. The methods used to calculate emissions for inventory purposes shall be based on the best available information accepted by AQD.

[OAC 252:100-5-2.1, -5-2.2, and OAC 252:100-8-6 (a)(8)]

SECTION VIII. TERM OF PERMIT

A. Unless specified otherwise, the term of an operating permit shall be five years from the date of issuance. [OAC 252:100-8-6 (a)(2)(A)]

B. A source's right to operate shall terminate upon the expiration of its permit unless a timely and complete renewal application has been submitted at least 180 days before the date of expiration. [OAC 252:100-8-7.1 (d)(1)]

C. A duly issued construction permit or authorization to construct or modify will terminate and become null and void (unless extended as provided in OAC 252:100-8-1.4(b)) if the construction is not commenced within 18 months after the date the permit or authorization was issued, or if work is suspended for more than 18 months after it is commenced. [OAC 252:100-8-1.4(a)]

D. The recipient of a construction permit shall apply for a permit to operate (or modified operating permit) within 180 days following the first day of operation. [OAC 252:100-8-4(b)(5)]

SECTION IX. SEVERABILITY

The provisions of this permit are severable and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby. [OAC 252:100-8-6 (a)(6)]

SECTION X. PROPERTY RIGHTS

A. This permit does not convey any property rights of any sort, or any exclusive privilege. [OAC 252:100-8-6 (a)(7)(D)]

B. This permit shall not be considered in any manner affecting the title of the premises upon which the equipment is located and does not release the permittee from any liability for damage to persons or property caused by or resulting from the maintenance or operation of the equipment for which the permit is issued. [OAC 252:100-8-6 (c)(6)]

SECTION XI. DUTY TO PROVIDE INFORMATION

A. The permittee shall furnish to the DEQ, upon receipt of a written request and within sixty (60) days of the request unless the DEQ specifies another time period, any information that the DEQ may request to determine whether cause exists for modifying, reopening, revoking, reissuing, terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the DEQ copies of records required to be kept by the permit. [OAC 252:100-8-6 (a)(7)(E)]

B. The permittee may make a claim of confidentiality for any information or records submitted pursuant to 27A O.S. 2-5-105(18). Confidential information shall be clearly labeled as such and shall be separable from the main body of the document such as in an attachment. [OAC 252:100-8-6 (a)(7)(E)]

C. Notification to the AQD of the sale or transfer of ownership of this facility is required and shall be made in writing within 10 days after such date.

[Oklahoma Clean Air Act, 27A O.S. § 2-5-112 (G)]

SECTION XII. REOPENING, MODIFICATION & REVOCATION

A. The permit may be modified, revoked, reopened and reissued, or terminated for cause. Except as provided for minor permit modifications, the filing of a request by the permittee for a permit modification, revocation, reissuance, termination, notification of planned changes, or anticipated noncompliance does not stay any permit condition.

[OAC 252:100-8-6 (a)(7)(C) and OAC 252:100-8-7.2 (b)]

B. The DEQ will reopen and revise or revoke this permit as necessary to remedy deficiencies in the following circumstances:

[OAC 252:100-8-7.3 and OAC 252:100-8-7.4(a)(2)]

- (1) Additional requirements under the Clean Air Act become applicable to a major source category three or more years prior to the expiration date of this permit. No such reopening is required if the effective date of the requirement is later than the expiration date of this permit.
- (2) The DEQ or the EPA determines that this permit contains a material mistake or that the permit must be revised or revoked to assure compliance with the applicable requirements.
- (3) The DEQ determines that inaccurate information was used in establishing the emission standards, limitations, or other conditions of this permit. The DEQ may revoke and not reissue this permit if it determines that the permittee has submitted false or misleading information to the DEQ.

C. If “grandfathered” status is claimed and granted for any equipment covered by this permit, it shall only apply under the following circumstances:

[OAC 252:100-5-1.1]

- (1) It only applies to that specific item by serial number or some other permanent identification.
- (2) Grandfathered status is lost if the item is significantly modified or if it is relocated outside the boundaries of the facility.

D. To make changes other than (1) those described in Section XVIII (Operational Flexibility), (2) administrative permit amendments, and (3) those not defined as an Insignificant Activity (Section XVI) or Trivial Activity (Section XVII), the permittee shall notify AQD. Such changes may require a permit modification.

[OAC 252:100-8-7.2 (b)]

E. Activities that will result in air emissions that exceed the trivial/insignificant levels and that are not specifically approved by this permit are prohibited. [OAC 252:100-8-6 (c)(6)]

SECTION XIII. INSPECTION & ENTRY

A. Upon presentation of credentials and other documents as may be required by law, the permittee shall allow authorized regulatory officials to perform the following (subject to the permittee's right to seek confidential treatment pursuant to 27A O.S. Supp. 1998, § 2-5-105(18) for confidential information submitted to or obtained by the DEQ under this section):

- (1) enter upon the permittee's premises during reasonable/normal working hours where a source is located or emissions-related activity is conducted, or where records must be kept under the conditions of the permit;
- (2) have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
- (3) inspect, at reasonable times and using reasonable safety practices, any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
- (4) as authorized by the Oklahoma Clean Air Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit.

[OAC 252:100-8-6 (c)(2)]

SECTION XIV. EMERGENCIES

A. Any emergency and/or exceedance that poses an imminent and substantial danger to public health, safety, or the environment shall be reported to AQD as soon as is practicable; but under no circumstance shall notification be more than 24 hours after the exceedance. [The degree of promptness in reporting shall be proportional to the degree of danger.]

[OAC 252:100-8-6 (a)(3)(C)(iii)(II)]

B. An "emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under this permit, due to unavoidable increases in emissions attributable to the emergency.

[OAC 252:100-8-2]

C. An emergency shall constitute an affirmative defense to an action brought for noncompliance with such technology-based emission limitation if the conditions of paragraph D below are met.

[OAC 252:100-8-6 (e)(1)]

D. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs or other relevant evidence that:

- (1) an emergency occurred and the permittee can identify the cause or causes of the emergency;
- (2) the permitted facility was at the time being properly operated;
- (3) during the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards or other requirements in this permit;
- (4) the permittee submitted notice of the emergency to AQD within 24 hours of the time when emission limitations were exceeded due to the emergency. This notice shall contain a description of the emergency, the probable cause of the exceedance, any steps taken to mitigate emissions, and corrective actions taken; and
- (5) the permittee submitted a follow up written report within 10 working days of first becoming aware of the exceedance.

[OAC 252:100-8-6 (e)(2), (a)(3)(C)(iii)(I) and (IV)]

E. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency shall have the burden of proof.

[OAC 252:100-8-6 (e)(3)]

SECTION XV. RISK MANAGEMENT PLAN

The permittee, if subject to the provision of Section 112(r) of the Clean Air Act, shall develop and register with the appropriate agency a risk management plan by June 20, 1999, or the applicable effective date.

[OAC 252:100-8-6 (a)(4)]

SECTION XVI. INSIGNIFICANT ACTIVITIES

Except as otherwise prohibited or limited by this permit, the permittee is hereby authorized to operate individual emissions units that are either on the list in Appendix I, or whose actual calendar year emissions do not exceed any of the limits below. Any activity to which a State or federal applicable requirement applies is not insignificant even if it meets the criteria below or is included on the insignificant activities list.

[OAC 252:100-8-2]

- (1) 5 tons per year of any one criteria pollutant.
- (2) 2 tons per year for any one hazardous air pollutant (HAP) or 5 tons per year for an aggregate of two or more HAP's, or 20 percent of any threshold less than 10 tons per year for single HAP that the EPA may establish by rule.
- (3) 0.6 tons per year for any one category A substance, 1.2 tons per year for any one category B substance or 6 tons per year for any one category C substance as defined in 252:100-41-40.

SECTION XVII. TRIVIAL ACTIVITIES

Except as otherwise prohibited or limited by this permit, the permittee is hereby authorized to operate any individual or combination of air emissions units that are considered inconsequential and are on the list in Appendix J. Any activity to which a State or federal applicable requirement applies is not trivial even if included on the trivial activities list. [OAC 252:100-8-2]

SECTION XVIII. OPERATIONAL FLEXIBILITY

A. A facility may implement any operating scenario allowed for in its Part 70 permit without the need for any permit revision or any notification to the DEQ (unless specified otherwise in the permit). When an operating scenario is changed, the permittee shall record in a log at the facility the scenario under which it is operating. [OAC 252:100-8-6 (a)(10) and (f)(1)]

B. The permittee may make changes within the facility that:

- (1) result in no net emissions increases,
- (2) are not modifications under any provision of Title I of the federal Clean Air Act, and
- (3) do not cause any hourly or annual permitted emission rate of any existing emissions unit to be exceeded;

provided that the facility provides the EPA and the DEQ with written notification as required below in advance of the proposed changes, which shall be a minimum of 7 days, or 24 hours for emergencies as defined in OAC 252:100-8-6 (e). The permittee, the DEQ, and the EPA shall attach each such notice to their copy of the permit. For each such change, the written notification required above shall include a brief description of the change within the permitted facility, the date on which the change will occur, any change in emissions, and any permit term or condition that is no longer applicable as a result of the change. The permit shield provided by this permit does not apply to any change made pursuant to this subsection.[OAC 252:100-8-6 (f)(2)]

SECTION XIX. OTHER APPLICABLE & STATE-ONLY REQUIREMENTS

A. The following applicable requirements and state-only requirements apply to the facility unless elsewhere covered by a more restrictive requirement:

- (1) No person shall cause or permit the discharge of emissions such that National Ambient Air Quality Standards (NAAQS) are exceeded on land outside the permitted facility. [OAC 252:100-3]
- (2) Open burning of refuse and other combustible material is prohibited except as authorized in the specific examples and under the conditions listed in the Open Burning Subchapter. [OAC 252:100-13]
- (3) No particulate emissions from any fuel-burning equipment with a rated heat input of 10 MMBTUH or less shall exceed 0.6 lb/MMBTU. [OAC 252:100-19]
- (4) For all emissions units not subject to an opacity limit promulgated under 40 CFR, Part 60, NSPS, no discharge of greater than 20% opacity is allowed except for short-term

occurrences which consist of not more than one six-minute period in any consecutive 60 minutes, not to exceed three such periods in any consecutive 24 hours. In no case shall the average of any six-minute period exceed 60% opacity. [OAC 252:100-25]

- (5) No visible fugitive dust emissions shall be discharged beyond the property line on which the emissions originate in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or interfere with the maintenance of air quality standards. [OAC 252:100-29]
- (6) No sulfur oxide emissions from new gas-fired fuel-burning equipment shall exceed 0.2 lb/MMBTU. No existing source shall exceed the listed ambient air standards for sulfur dioxide. [OAC 252:100-31]
- (7) Volatile Organic Compound (VOC) storage tanks built after December 24, 1974, and with a capacity of 400 gallons or more storing a liquid with a vapor pressure of 1.5 psia or greater under actual conditions shall be equipped with a permanent submerged fill pipe or with a vapor-recovery system. [OAC 252:100-37-15(b)]
- (8) All fuel-burning equipment shall at all times be properly operated and maintained in a manner that will minimize emissions of VOCs. [OAC 252:100-37-36]
- (9) Except as otherwise provided, no person shall cause or permit the emissions of any toxic air contaminant in such concentration as to cause or to contribute to a violation of the MAAC. (State only) [OAC 252:100-41]

SECTION XX. STRATOSPHERIC OZONE PROTECTION

A. The permittee shall comply with the following standards for production and consumption of ozone-depleting substances. [40 CFR 82, Subpart A]

- 1. Persons producing, importing, or placing an order for production or importation of certain class I and class II substances, HCFC-22, or HCFC-141b shall be subject to the requirements of §82.4.
- 2. Producers, importers, exporters, purchasers, and persons who transform or destroy certain class I and class II substances, HCFC-22, or HCFC-141b are subject to the recordkeeping requirements at §82.13.
- 3. Class I substances (listed at Appendix A to Subpart A) include certain CFCs, Halons, HBFCs, carbon tetrachloride, trichloroethane (methyl chloroform), and bromomethane (Methyl Bromide). Class II substances (listed at Appendix B to Subpart A) include HCFCs.

B. If the permittee performs a service on motor (fleet) vehicles when this service involves an ozone-depleting substance refrigerant (or regulated substitute substance) in the motor vehicle air conditioner (MVAC), the permittee is subject to all applicable requirements. Note: The term “motor vehicle” as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed. The term “MVAC” as used in Subpart B does not include the air-tight sealed refrigeration system used as refrigerated cargo, or the system used on passenger buses using HCFC-22 refrigerant. [40 CFR 82, Subpart B]

C. The permittee shall comply with the following standards for recycling and emissions reduction except as provided for MVACs in Subpart B. [40 CFR 82, Subpart F]

- (1) Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to § 82.156.
- (2) Equipment used during the maintenance, service, repair, or disposal of appliances must comply with the standards for recycling and recovery equipment pursuant to § 82.158.
- (3) Persons performing maintenance, service, repair, or disposal of appliances must be certified by an approved technician certification program pursuant to § 82.161.
- (4) Persons disposing of small appliances, MVACs, and MVAC-like appliances must comply with record-keeping requirements pursuant to § 82.166.
- (5) Persons owning commercial or industrial process refrigeration equipment must comply with leak repair requirements pursuant to § 82.158.
- (6) Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to § 82.166.

SECTION XXI. TITLE V APPROVAL LANGUAGE

A. DEQ wishes to reduce the time and work associated with permit review and, wherever it is not inconsistent with Federal requirements, to provide for incorporation of requirements established through construction permitting into the Sources' Title V permit without causing redundant review. Requirements from construction permits may be incorporated into the Title V permit through the administrative amendment process set forth in Oklahoma Administrative Code 252:100-8-7.2(a) only if the following procedures are followed:

- (1) The construction permit goes out for a 30-day public notice and comment using the procedures set forth in 40 Code of Federal Regulations (CFR) § 70.7 (h)(1). This public notice shall include notice to the public that this permit is subject to Environmental Protection Agency (EPA) review, EPA objection, and petition to EPA, as provided by 40 CFR § 70.8; that the requirements of the construction permit will be incorporated into the Title V permit through the administrative amendment process; that the public will not receive another opportunity to provide comments when the requirements are incorporated into the Title V permit; and that EPA review, EPA objection, and petitions to EPA will not be available to the public when requirements from the construction permit are incorporated into the Title V permit.
- (2) A copy of the construction permit application is sent to EPA, as provided by 40 CFR § 70.8(a)(1).
- (3) A copy of the draft construction permit is sent to any affected State, as provided by 40 CFR § 70.8(b).
- (4) A copy of the proposed construction permit is sent to EPA for a 45-day review period as provided by 40 CFR § 70.8(a) and (c).
- (5) The DEQ complies with 40 CFR § 70.8 (c) upon the written receipt within the 45-day comment period of any EPA objection to the construction permit. The DEQ shall not issue the permit until EPA's objections are resolved to the satisfaction of EPA.

- (6) The DEQ complies with 40 CFR § 70.8 (d).
- (7) A copy of the final construction permit is sent to EPA as provided by 40 CFR § 70.8 (a).
- (8) The DEQ shall not issue the proposed construction permit until any affected State and EPA have had an opportunity to review the proposed permit, as provided by these permit conditions.
- (9) Any requirements of the construction permit may be reopened for cause after incorporation into the Title V permit by the administrative amendment process, by DEQ as provided in OAC 252:100-8-7.3 (a), (b), and (c), and by EPA as provided in 40 CFR § 70.7 (f) and (g).
- (10) The DEQ shall not issue the administrative permit amendment if performance tests fail to demonstrate that the source is operating in substantial compliance with all permit requirements.

- B. To the extent that these conditions are not followed, the Title V permit must go through the Title V review process.

SECTION XXII. CREDIBLE EVIDENCE

For the purpose of submitting compliance certifications or establishing whether or not a person has violated or is in violation of any provision of the Oklahoma implementation plan, nothing shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

[OAC 252:100-43-6]

Valero Energy Corporation
TPI Petroleum, Inc.
Attn: Mr. John Shriver, P.E.
Environmental Manager
Post Office Box 188
Ardmore, OK 74302

Re: Construction Permit No. **98-172-C (M-15) (PSD)**
Valero Ardmore Refinery - Administrative Consent Order No. 02-007, Existing SRU
with TGTU, & ARU, New Boiler/CO Boiler, and Alkylate Railcar Loading Station
Ardmore, Carter County

Dear Mr. Shriver:

Enclosed is the permit authorizing construction of the referenced facility. Please note that this permit is issued subject to standard and specific conditions, which are attached. These conditions must be carefully followed since they define the limits of the permit and will be confirmed by periodic inspections.

Also note that you are required to annually submit an emissions inventory for this facility. An emissions inventory must be completed on approved AQD forms and submitted (hardcopy or electronically) by March 1st of every year. Any questions concerning the form or submittal process should be referred to the Emissions Inventory Staff at 405-702-4100.

Thank you for your cooperation. If you have any questions, please refer to the permit number above and contact me at (405) 702-4217.

Sincerely,

Eric L. Milligan, P.E.
Engineering Section
AIR QUALITY DIVISION

Enclosures

Copy: Ardmore DEQ Office (Carter County)



PART 70 PERMIT

AIR QUALITY DIVISION
STATE OF OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
707 NORTH ROBINSON, SUITE 4100
P.O. BOX 1677
OKLAHOMA CITY, OKLAHOMA 73101-1677

Issuance Date: _____

Permit Number: 98-172-C (M-15) (PSD)

Valero Energy Corporation, TPI Petroleum, Inc.,

having complied with the requirements of the law, is hereby granted permission to
construct/modify the Valero Ardmore Refinery in accordance with this permit in Carter
County, Oklahoma,

subject to the following conditions, attached:

☒ [X] Standard Conditions dated October 15, 2003

☒ [X] Specific Conditions

In the absence of construction commencement, this permit shall expire 18 months from the issuance date, except as authorized under Section VIII of the Standard Conditions.

Division Director, Air Quality Division